A CENTENNIAL OF STRENGTH, SPIRIT, AND TECHNOLOGY:

PEARL HARBOR NAVAL SHIPYARD

Military Campus Programs

By the Students of HIST 4961: Seminar in Military History

Hawai'i Pacific University

Sponsored by the Honolulu Council of the Navy League

PROLOGUE

The following works discuss topics pertinent to the study of the Pearl Harbor Naval Shipyard to help celebrate and document its 100 years of history. They fall into the three broader themes of strength, spirit, and technology describing people, trends, events, logistical feats, and technical advances that impacted not only Pearl Harbor but society as whole. The students were part of a course called Seminar in Military History at Hawai'i Pacific University that was conducted from January 7 to March 19, 2008. This project, as well as the history of Pearl Harbor and the Shipyard, was the focus of the course. Many of the topics had to be based entirely on primary sources since little study had previously been undertaken on the Shipyard itself. The works are unaltered by me, the instructor, beyond the feedback and edits the students received and implemented during the semester.

Thank you to the Shipyard for allowing us access to their archives and their many helpful employees including Carolyn Brewster, Melissa Lamerson, Michael Laley, Nolan Chang, and Kerry Gershaneck who were of especially great help to the students in completing this project. Thank you to the Honolulu Council of the Navy League for providing grant money for the printing of this project and its staff including Bruce Smith, Robert McDermott, and Leon Watson. Thank you to HPU's Administrative Support Operations and Printshop and their staff for the production of the project including Jamie Kemp and Todd Goya. Thank you to HPU's Military Campus Programs and Dean Robert Cyboron for providing the opportunity for these great minds to further their education and to collaborate with each other. Thank you to Hickam Air Force Base for hosting the course at their facility. Finally, thank you to the students of this class for challenging each other to excellence.

- Justin W. Vance
Military Campus Programs
Hawai'i Pacific University

Cover photo: Damaged hull of the USS Maryland, Pearl Harbor, HI, 1944. Official U.S. Navy Photo

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DEDICATION

This publication was compiled through the focused research and production efforts of undergraduate students at Hawai'i Pacific University, under the supervision of the faculty member Justin Vance. The timing of the group's effort was coincident with the upcoming observance of the 100th anniversary of operation of Pearl Harbor Naval Shipyard, providing an ideal and most appropriate opportunity to feature the Shipyard – one of our genuine national treasures.

Pearl Harbor Naval Shipyard has been a unique and irreplaceable resource to our Navy and our Nation, from its inception in the early 1900s as a coaling station established in the fledgling Territory of Hawaii to the present. As the essays in this collection relate, the Shipyard's extraordinary status stems from a powerful combination of effects. A unique confluence of factors including geography, topography, climate, strategic location, political alignments, worldwide technological developments, and proximity to fleet operating areas and porting – along with an indomitable "can do" workforce – make the Pearl Harbor Shipyard a true "crown jewel" of our national security. It is far more than a Navy maintenance activity – it's a national asset.

As the Shipyard observes its centennial celebration, those 100 years of heroic professionalism and service performed to date, serve as an inspiration and a compass for those presently serving in the Yard. The remarkable achievements of the Yard throughout the 20th century will stand it in good stead as the leaders and the workforce face the certainty of continued and yet unknown challenges in the 21st century.

This publication, therefore, is hereby dedicated to the thousands of men and women who are the real heart and soul of this national treasure of ours – the military and civilian workforce of Pearl Harbor Naval Shipyard – past, present and future. They continue to be our most valuable asset – undaunted by challenges, undefeated by adversity and unmatched by any of America's would be competitors.

Bruce E. Smith
Captain, U.S. Navy (retired)

A distinguished Navy submariner, Captain Smith served multiple tours of duty at sea and ashore, closely associated with Pearl Harbor Naval Shipyard and its direct influence on the Navy's operations. He commanded the submarine USS Parche (SSN 683) and Submarine Squadron 11, and served as Chief of Staff of the Submarine Force, U.S. Pacific Fleet. He also served on the senior executive staffs of Commander, U.S. Pacific Fleet and Commander, U.S. Pacific Command. Captain Smith retired from active duty in 2006, now residing in Honolulu.

Part I: Strength

BIRTH OF THE SHIPYARD

By Aaron Duffey

To look at Pearl Harbor today, with its massive ships and facilities, it is difficult to imagine that just over a century and half ago there was little present other than coral and sea. The appropriation of Pearl Harbor by the United States has led to the creation of one of the greatest military harbors in the world. What took place in order for Pearl Harbor to get where it is today? The path from a small fishing harbor to military necessity started slowly then reached a period of rapid growth until war gripped the world. The early years of development are a combination of secrecy, diplomacy, acquisition, and major spending.

Despite years of indecision regarding the Hawaiian Islands, the end of the 19th century brought a decidedly different approach towards the islands. At the conclusion of the Civil War the United States' outlook on the importance of the Hawaiian isles started to change. By 1890, Alfred Mahan, the celebrated Naval visionary, supported the possibility of acquisitioning the Hawaiian Islands. Mahan suggested Hawaii for two main reasons: "first, the islands could serve as a provisioning and coaling station. Second, they would be the first line of defense against attack on the mainland by any Asian power." [i] Years before, but with a similar mindset to Mahan, in 1872 the Secretary of War William W. Belknap decided to send a pair of officers on a covert surveying mission of Oahu. Leader of the operation was Major General John M. Schofield, a military man beyond reproach with a distinguished military record along with a Medal of Honor. Accompanying General Schofield was Lieutenant Colonel Burton S. Alexander, an engineer, also a celebrated military officer.

The decision to inspect Oahu was made with considerable care. The French and English desired little American influence in the Pacific, therefore the actions of General Schofield and Colonel Alexander were to be performed in secret and their survey could not be construed as "a prelude to acquisition."[ii] As part of the ruse, the officers boarded the USS *California* as mere vacationers and were guests of the Admiral of the ship. Upon arrival to the islands General Schofield and Colonel Alexander met with King Lunalilo and requested the right to tour *Wai Momi* (Pearl River) and the other islands. In one of his reports General Schofield had this to say regarding the islands:

"With one exception there is no harbor on the Islands that can be made to satisfy all the conditions necessary for a harbor of refuge in time of war. This exception is the harbor of '*Ewa*' or 'Pearl River' situated in the island of Oahu, about seven miles west of Honolulu."[iii]

During their visit to the Hawaiian Islands, Gen. Schofield began to understand the importance of the sugar trade to the local inhabitants. This understanding led to Gen. Schofield's recommendation that annexation of the islands or cession of the Pearl Harbor area should be considered. Annexation was not strongly considered but the idea of cession by way of trade reciprocity was feasible. Gen. Schofield, with considerable information from Hawaiian newsman Henry Whitney, suggested that the desire of local sugar producers to have high import tariffs removed could sufficiently influence the crown to seek reciprocity and allow the United States access to Pearl Harbor.[iv] A local Hawaiian magazine referenced his report and titled an article "Worth its Weight in Sugar-Pearl Harbor."[v]

In 1875, a treaty of reciprocity went into effect between the United States and Hawaii. This treaty allowed for sugar to enter the United States free of tariffs and gave America rights to land and sea in and around Pearl Harbor. [vi] This was a rather problematic treaty that served not much more than a foundation for future diplomacy. The treaty was not a complete failure as it opened up further trade between the U.S. and Hawaii. American products were allowed into Hawaii and Hawaiian rice and sugar freely entered the U.S. markets. Due to the seven year limit of the treaty, America was reluctant to build up Pearl Harbor for fear of it falling out of its possession. At the seven year mark in 1883, the treaty lapsed but was renewed yearly without further discussion. [vii] After several years of infighting among Hawaiian officials, a more advantageous treaty to all parties was sought.

The U.S. Senate was tired of the current arrangement with the Hawaiian government and the need for a permanent establishment in Pearl Harbor was necessary for a new treaty to be signed. The Senate grasped its clear bargaining power. Due to the prosperity and expansion of the Hawaiian sugar trade, Hawaiian officials understood the need for reciprocity with the United States. In consideration

to this, the Hawaiian government offered Pearl Harbor as a repair and refueling station for U.S. vessels.[viii] This was not exactly what the U.S. had in mind, and therefore pushed their agenda further; exclusive use of Pearl Harbor was needed so a Naval Base could be constructed. It was during this diplomatic period that England decided to put pressure on the U.S. government. England cited a Franco-English compact in 1843 which agreed that neither nation would take possession of the islands and that the United States should join them in this agreement. The English stated further that "the neutrality and accessibility of Hawaiian harbors to all ships of all nations" be guaranteed. [ix] Despite this pressure, the protests of the English would fall on deaf ears and in 1887; King Kalakaua and the United States signed a new treaty. This came as a direct result of what has been dubbed "The Bayonet Constitution," a new constitution that considerably limited the monarch's power. Some argue, King Kalakaua was practically forced to sign the treaty.[x] The Treaty of Reciprocity of 1887 gave the United States the authority to pursue their goal of having a Naval Base at Pearl Harbor. King Kalakaua in a proclamation to his people stated:

"His majesty grants to the United States the exclusive right to enter the harbor of Pearl River and establish a coaling and repair station for the use of vessels of the United States. And to that end, the U.S. may improve the entrance to said harbor and do all the other things needful to the purpose aforesaid."[xi]

Although this new treaty permitted exactly what was desired, the United States did relatively little to improve Pearl Harbor for over a decade.

Things began to change around the turn of the century with the annexation of Hawaii. Following the Spanish-American War, American interests in the Pacific increased substantially and the overall political climate in the Hawaiian Islands led to their annexation by the United States. What made this act so important to the creation of Pearl Harbor was that the Republic of Hawaii ceded absolutely, without reserve, all rights of sovereignty over the islands and their dependencies, all crown lands, harbors and ports, public buildings, military equipment and public property of every kind and description that belonged to the government of the Hawaiian Islands.[xii]

At this point the tempo for operations at Pearl Harbor intensified significantly; specifically with the Appropriation Act of 1901.

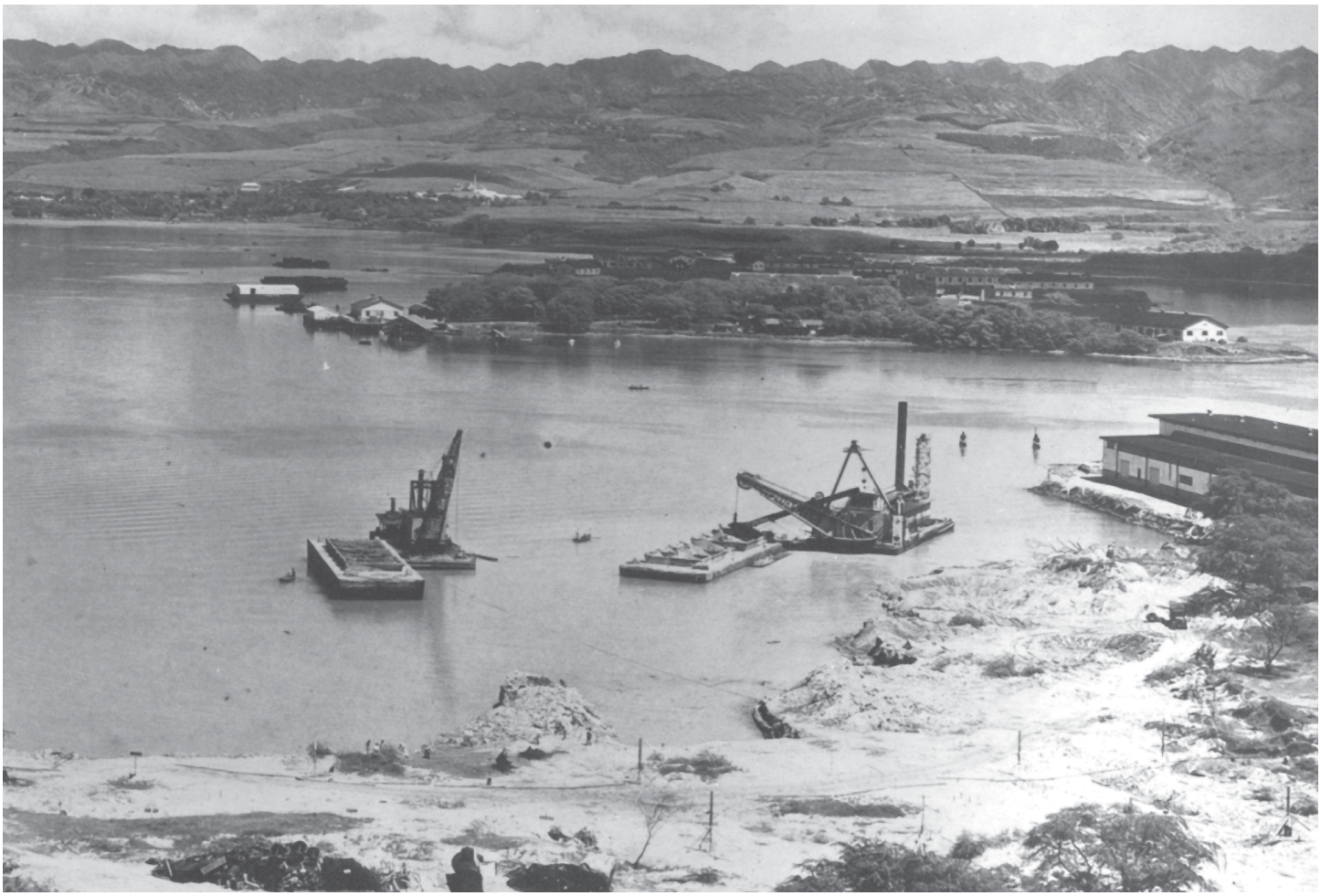
The Appropriation Act of 1901 allocated $150,000 for the acquisition of land for a naval station and harbor, along with defenses to protect the new American possession.[xiii] This act would spark the transition from a small inlet to the grand harbor that is present today. Around 1901, the lands surrounding Pearl Harbor were privately owned agricultural areas. These lands needed to be procured for the advancement of the harbor. Unfortunately many of the landowners were not willing to part with the land at the prices the government was willing to pay. Since a compromise could not be made, the court system of Hawaii settled the matter and the landowners were paid. The Federal government had acquired the necessary lands.

Around 1902, the reef bar that blocked the entrance to Pearl Harbor was dredged. The channel created was only 30 feet deep and 200 feet wide, just large enough for small gunboats to pass through.[xiv] During the dredging of the bar there was an inauspicious Kona storm that resulted in the sinking of one dredge and the beaching of another. This event, according to many locals, was in direct response to the unheeded warnings regarding the shark goddess of Pearl Harbor. Although the dredging was a success, this was foreshadowing of what would happen a decade later.

The next significant event was the establishment of what is now the Pearl Harbor Naval Shipyard. The Act of May 13, 1908, allocated $400,000 for dredging and entrance channel to Pearl Harbor.[xv] This act required the dredges to channel enough depth and width so that even the largest ships would be able to pass through. Along with the channel this act authorized $300,000 for machine shops, $300,000 for store houses, and $100,000 for immediate yard development, which is why this date is considered the official birthday of the Shipyard.[xvi]

Along with the funds for the Shipyard itself, there was a $2,000,000 allocation for a dry dock to be built.[xvii] This first dry dock, like many other desires for the harbor, would be far more difficult to see to fruition than originally thought. There were several competing visions as to the size of the dry dock, but more importantly were the differences in opinion regarding the funding that would be given. Those that were naval minded were requesting a far larger dock that would be capable of housing even the largest ships. Congress, however, was far more preoccupied with the building costs. With this conflict of interest, those with the power (Congress), made the ultimate decision that a smaller, more economical dry dock be built.

Despite the careful planning and considerations made by those responsible for building the dry dock, one matter



Pearl Harbor during the early years. Official U.S. Navy Photo

was left unattended. On February 17, 1913, something went horribly wrong and the dry dock imploded. The question in the minds of the engineers and builders was how could that have happened? After careful consideration the cause was determined to be underground pressure. However, this conclusion was not shared by all; in fact most of the local workers on the project knew right away what caused the disaster.

The new dry dock, along with the Shipyard in general was situated on a sacred site. The goddess *Ka'ahupahau* dwelt in the *Wai Momi,* or the waters of Pearl Harbor. She was a very kind goddess that kept the people safe, as long as they had good intentions. Unfortunately for the Navy, the new dry dock was planned to sit right on top of *Ka'ahupahau's* son, *Ku-pipi's,* home. This was a dangerous endeavor, to build on such a site. One man in particular, Kupuna Kanakeawe, had warned that this was an intrusion and disaster would surely ensue.[xviii] The Navy and other Western minds did not listen to the old man, they were confident in their planning and engineering. Kupuna was nonetheless concerned and set out to placate the gods with daily offerings; seeking protection and safety for the workers. On that fateful day in 1913, David Richards witnessed the event:

"At the end of four days our instruments indicated that the bottom would rise. All the men were ordered to come up and also the divers on the outside. Then just as the last diver emerged, section two let go its bottom, and sections one and three caved in. The sound of section two crashing was like that of an explosion of tons of black powder. It was unbelievable that those huge timbers could be crushed to splinters in so short a time. Luckily no one was hurt. Nearly $4,000,000 and four long years of hard work were destroyed in about four minutes."[xix]

It is said that local *Kama'aina* old timers, "just shook their heads with no surprise at all."[xx] No progress was made following the disaster until August of 1914, when Congress appropriated nearly $5,000,000 to rebuild the dry dock.

This time, however, the design for the dock was radically different, and a blessing was given to the site. With the new design and blessing, the dry dock has worked dutifully for 90 years.[xxi]

During the dry dock construction years there were many other significant milestones in the Pearl Harbor Naval Shipyard. On December 16, 1911, the USS *California* steamed into Pearl Harbor and rested beside the Shipyard. This was the first large ship to pass through the newly dredged channel and it was made a grand occasion. The USS *California* was the flagship of the Pacific Station and it was loaded full of local celebrities and dignitaries to mark the milestone.[xxii]

The year 1912 was marked for massive additions to the Shipyard's facilities; setting a trend for the next several years. In the Appropriations Act of 1912, considerable funding was given for the creation and/or refitting of many shops in the naval yard. The most significant allotment went towards a $250,000 power plant, along with a foundry and a forge shop. There were funds allocated for ship-fitting and sheet-metal shop, copper pipe and plumbing shop, and a woodworking shop.[xxiii] Overall there was just under $1,000,000 of appropriations for the fledgling Shipyard. The next year appropriations reached $1,894,000 throughout Pearl Harbor, allowing for continuous expansion and improvements in the facilities and infrastructure. By August of 1913, the Commandant of the Naval Station and administrative personnel in Honolulu had relocated to the new facilities at Pearl Harbor. This move helped to finalize the transition to Pearl Harbor as the center for naval operations in Hawaii and the Pacific.

There have been many improvements over the years to the Pearl Harbor Naval Shipyard and the importance of the Shipyard will never be tested greater than after the attacks of 1941. Pearl Harbor and its shipyard have played a crucial role in naval operations in the Pacific since its creation. The efforts of many have turned a natural defensive harbor into a sprawling naval complex capable of servicing massive ships of both size and number.

Notes

[i] Lyndall and Donald Landauer. *Pearl*, (Flying Cloud Press, 1999), 116.
[ii] Ibid, 116.
[iii] Ibid, 117.
[iv] Gavan Daws, *Shoal of Time*, (University of Hawaii Press, 1968), 191.
[v] Landauer, 117.
[vi] "A 1958 History of Pearl Harbor and Our Shipyard." *Shipyard Log*. 31 July 1958, 3.
[vii] Landauer, 131.
[viii] Ibid, 131.
[ix] Ibid, 131.
[x] Pat Pitzer, *The Overthrow of the Monarchy*, 1994.
[xi] Landauer, 131.
[xii] Ibid, 161.
[xiii] *Pearl Harbor Naval Shipyard Command History (1908-1959)*. Management Engineering, Division Management, Planning and Review Department, 1959, 3.
[xiv] Landauer, 180.
[xv] *A Brief History of Pearl Harbor in its Relation to the U.S. Navy*, (1983), 6.
[xvi] *Command History*, 3.
[xvii] *A Brief History*, 7.
[xviii] Landauer, 222.
[xix] Ibid, 224.
[xx] Ibid, 225.
[xxi] Ibid, 228.
[xxii] A 1958 History, 5.
[xxiii] Command History, 9.

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PEARL HARBOR NAVAL SHIPYARD: STRATEGICALLY LOCATED TO "KEEP THEM FIT TO FIGHT"

By Jeremy D. Bay

"As bad as our losses were at Pearl Harbor, they could have been devastatingly worse, had the Japanese returned for more strikes against our naval installations, surface oil storage and our submarine base installations." [i]

Fleet Admiral Nimitz's statement could not have been more accurate. It still rings true today, as it did in 1942. Over the last 100 years, the strategic location of Pearl Harbor Naval Shipyard has been a critical piece in the United States Navy's strategy and progress in the Pacific. The Shipyard certainly proved its worth during the aftermath of the Japanese attack on Pearl Harbor, but the importance of the Shipyard in Pearl Harbor before and after World War II cannot be overstated.

In 1845, following British Lord Paulet's attempt to annex the Hawaiian Islands for the British crown, the Hawaiian Minister of Foreign Affairs, Dr. C.P. Judd, sought assistance from the frigate *USS Constitution* operating in Hawaiian waters. *Constitution* sent a Marine, Lieutenant Curtis, who surveyed the land and provided recommendations to fortify the now Hawaiian capital of Honolulu against further aggression from other nations. Lieutenant Curtis' report to the Minister contained the first mention of Pearl Harbor as having "perfect security."[ii]

For over 25 years, no action was taken on Lieutenant Curtis' report, until in 1873; *USS California* arrived in Hawaiian waters carrying Rear Admiral A.M. Pennock, Major General J.M. Schofield, and Brigadier General B.S. Alexander. They conducted a classified survey, under the direction of Secretary of War William Belknap on defensibility and commercial infrastructure of the Hawaiian Islands.

General Schofield filed his report recommending that the United States pursue a cession of "Pearl Harbor, together with its shore for 4 or 5 miles back, and suggesting that it might be deeded free of cost, to the United States in return for allowing Hawaiian sugar duty free."[iii] Several years later, such a deal was struck and the 1887 Treaty of Reciprocity took effect. In 1898, the United States annexed Hawaii, which "extended U.S. territory into the Pacific and resulted from economic integration and the rise of the United States as a Pacific power."[iv]

Roughly three years passed until an appropriations act was passed in March of 1901, which authorized the building of a coaling station and the acquisition of land for a naval station. On May 13, 1908, Congress passed an additional appropriations bill that authorized the building of a dry dock at Pearl Harbor, officially creating Navy Yard Pearl Harbor. Construction of "DD#1" was completed in 1919, after the tragic explosion of the initial construct in 1913.[v] In the years that followed, much of the Navy infrastructure, including machine shops, hospital buildings and numerous command and control building grew around the Navy Yard, establishing Pearl Harbor as an official Naval Station.

In February of 1917, the U.S. Navy made its first military capture of World War I, and the Navy Yard at Pearl Harbor established its role in the conflict, with the German Gunboat G*reier* and her tender. While German crews tried to scuttle and destroy these ships, their attempts were thwarted by U.S. forces, and the crew taken prisoner. The captured vessels were shipped to the Pearl Harbor Navy Yard where, after four months, they were repaired and re-outfitted under the U.S. flag.[vi]

Following World War I, the Shipyard and the surrounding Naval Station and support facilities continued to expand and progress, while the United States operated under the Monroe Doctrine regarding foreign affairs choosing not to get entangled politically and militarily in world affairs. Day-to-day business moved forward, with little outside influence until December 7, 1941, "a date that will live in infamy."[vii]

On December 7, 1941, just prior to morning colors at 0800, Japanese naval forces attacked the U.S. Pacific Fleet that had been moved to Pearl Harbor 18 months earlier by President Franklin D. Roosevelt as a strategic deterrent to Japanese military action. The Japanese were in desperate need of resources to continue their seemingly endless invasion of China.[viii] However, the deterrent was meant to keep Japan from attacking the Indies, Philippines, and Malaya – there was no anticipation of a Japanese attack so far to the East.[ix]

The aftermath of the Japanese attack on Pearl Harbor left 21 ships heavily damaged or sunk[x] including the nine battleships at Pearl Harbor: *Arizona, California, Nevada, Maryland, Oklahoma, Pennsylvania, West Virginia, Tennessee,*

and *Utah*.[xi] Due to the exhaustive efforts of the Navy Yard at Pearl Harbor, all but three of the 21 damaged ships returned to fight in World War II conflicts.

It was critical, fortunate, and perhaps a bit lucky that Navy Yard Pearl Harbor was intact and nearby. Had the Yard not been in Pearl Harbor, it is doubtful that the number of ships that returned to fight in the Pacific Campaign would have been as significant.

Take, for example, the massively torpedoed USS *Oklahoma*, which had her port side torn open, quickly capsized and sank to the bottom of Pearl Harbor, where more than 400 sailors were trapped and lost their lives. Through the diligent efforts of shipyard workers, she was righted, raised to the surface and moved to the Navy Yard. It was later assessed that *Oklahoma* was too aged and heavily damaged to be repaired, so she underwent a salvage operation to remove her gun turrets and returned to seaworthiness. During her transit to the West Coast for scrapping in 1946, *Oklahoma* sunk to the bottom of the Pacific Ocean. While it is impossible to say what would have really happened, one can only speculate that had the Shipyard not been in place, a large percentage of the other ships damaged in the attack on Pearl Harbor would have joined *Oklahoma* had they been required to make the ten day transit across the Eastern Pacific for repair.

The great sense of pride and nationalism that resounded from Americans after the attack on Pearl Harbor invigorated the Shipyard. Critical and timely repairs were made to *California* which subsequently fought in the Leyte Campaign, including the Battle of Surigao Straight, the last battle between opposing battleships.[xii] The Shipyard made preliminary repairs to *West Virginia*, who later returned to service and took part in the capture of Iwo Jima and Okinawa.[xiii]

Perhaps the most critical repair operation that the Navy Yard at Pearl Harbor undertook during World War II was that of the aircraft carrier *USS Yorktown*. *Yorktown* was heavily damaged in February 1942, during the Battle of Coral Sea while assisting in sinking the Japanese carrier *Shoho* and damaging *Shokaku*.[xiv] Had *Yorktown* been required to make the transit from the Northeastern coast of Australia, one can speculate that she may not have made it to the West Coast of the United States for repairs, and certainly would not have made the nearly 21 day transit to able to fight in the Battle of Midway.

The strategic placement of the Navy Yard at Pearl Harbor again proved critical to the war fighting cause. Within two days of steaming into Pearl Harbor, thousands of workers labored around the clock to ensure *Yorktown* was repaired to a condition that allowed her to participate in the 4-7 June, 1942, Battle of Midway, where again she assisted in the destruction of Japanese carriers, this time *Soryu* and *Hiryu*.[xv] This crucial battle turned the tide of the War in the Pacific. *Yorktown* was ultimately sunk as a result of her battle damage, but had she not participated in the Battle of Midway, the United States forces would have been outnumbered two-to-one in carriers and the U.S. campaign in the Pacific may have ended with a very different result.

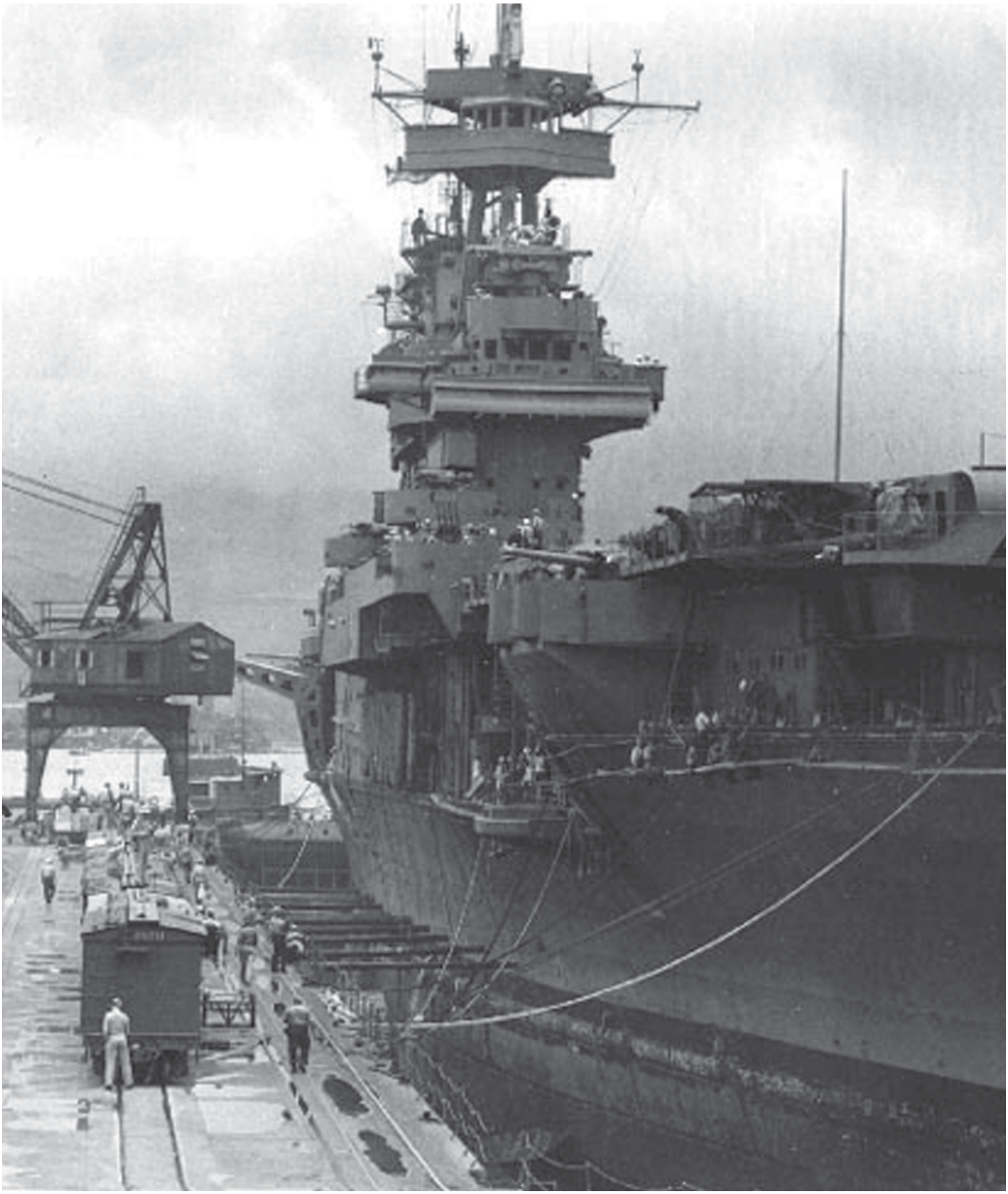
During the early weeks of 1969, the now Pearl Harbor Naval Shipyard again proved critical in its location in the Pacific. While steaming en route to Pearl Harbor, USS *Enterprise (CVAN-65)* endured a tragic ordnance explosion and fire on her flight deck that took the lives of 28 sailors, destroyed 15 aircraft and left gaping holes in the flight deck and damaged compartments beneath.[xvi] Within four days of the disaster, Pearl Harbor Naval Shipyard personnel were flown to *Enterprise* to begin emergent repairs – a feat that would not have been possible if the Shipyard in Pearl Harbor did not exist. As a result, after only 49 days, *Enterprise* returned to sea and continued to contribute to the campaign in Vietnam.

The year 2005, brought perhaps the Naval Shipyard at Pearl Harbor's greatest challenge. The Shipyard had been under consideration on the Defense Base Closure and Realignment (BRAC) Commission's list of facilities to be downsized and closed. In an amazing rally of support from political leaders and the community, the Shipyard was kept off the list. In a joint letter from the Hawaii delegation consisting of Senators Inouye and Akaka as well as Congressmen Abercrombie and Case to BRAC Chairman Principi the following argument was presented:

"The overwhelming strategic value of Pearl Harbor Naval Shipyard is clear. Pearl Harbor Naval Shipyard is the largest ship repair facility between the west coast and the Far East and home port to 29 ships. It plays an irreplaceable role in maintaining the Navy's fleet readiness and defense capabilities. If closed or reduced in capabilities, these ships would, in some cases, have to transit to the east coast for maintenance. This action could severely impact the Navy's readiness and homeland defense capabilities"[xvii]

The letter further states:

"Realignment of the Pearl Harbor Naval Shipyard would have a negative impact on the quality of life of our sailors and their families. Families would have to be uproot-



USS Yorktown is repaired in Dry Dock #1 in time for Battle of Midway, 1942. Official U.S. Navy Photo

Aerial View of Pearl Harbor Naval Shipyard. PHNSY Archives

ed and relocated to the mainland for long term maintenance, a costly and unnecessary upheaval."[xviii]

The Shipyard's strategic location in the Middle Pacific and support to the entirety of the Pacific Fleet, coupled with the employment of approximately 4,100 civilian employees on the island of Oahu, weighed heavily in the decision to keep Pearl Harbor Naval Shipyard operational, and allowed continued support of fleet requirements into the 21st century.

In her testimony before the BRAC Commission, on 18 July 2005, Hawaii Governor Linda Lingle stated:

"The Pacific Fleet's Area of Responsibility covers 100 million miles in the Pacific, Indian and Arctic Oceans from the West Coast of the United States to the East Coast of Africa. Located in the middle of the Pacific Ocean, Pearl Harbor Naval Shipyard is six days ship transit time from the West Coast of the United States, nine days transit time from the Territory of Guam and sixteen days ship transit time from Singapore."[xix]

Over the last 100 years, the strategic placement of Pearl Harbor Naval Shipyard has proven critically important in cost savings to the Navy and war-fighting readiness. The Shipyard has made critical repairs to the Navy's fighting forces that have played significant roles in Pacific conflicts – the repair of 18 of the 21 damaged ships at Pearl Harbor and record-breaking repair of *Yorktown* both had a tremendous effect on the outcome of the Pacific Campaign during World War II.

The Shipyard conducted 3,000 ship repairs during the Korean War and carried out 800 repairs yearly during the Vietnam Era. The Shipyard made emergent repairs that extended the service of USS *Denver, Greeneville, San Francisco and Newport News*. Today the Shipyard maintains and repairs 30 of 62 ships engaged in Operations ENDURING FREEDOM and IRAQI FREEDOM. The Shipyard continues to boost the local economy and job market by pro-

viding more than 4,100 employees with jobs and advanced technical training.[xx]

In his address to the 7th Annual Hawaii-U.S. Military Partnership Conference on January 3, 2008, Admiral Robert F. Willard, Commander, U.S. Pacific Fleet stated:

"The strategic importance of the state of Hawaii hasn't changed in 65 years. When the Japanese failed to destroy the fuel reserves on island and failed to destroy the Shipyard on island, it mattered greatly in the outcome of World War II, and those same fuel reserves at Red Hill Fuel Farm remain the second largest strategic fuel reserves in the Pacific. The Shipyard remains our farthest forward shipyard capability in the Pacific and it's not as much about the 5,000 workers as much as it is about the importance of that shipyard to our war fighting readiness and to the day-to-day operational availability of the ships not only located here but also located on the West Coast of the United States and located forward in Japan that utilize this facility on occasion. It's an important strategic asset for the United States, and it's important that the dry docks, and the tooling, and the workshops and the management of that workforce remain state of the art on this island and for this Pacific fleet. So we are very interested in the strategic importance of Pearl Harbor, and in particular Pearl Harbor Naval Shipyard."[xxi]

Today, the strategic placement of Pearl Harbor Naval Shipyard, its technological capabilities and four dry docks are priceless in the amount of saved lives, resources, transit time, and fuel. Additionally it adds to the quality of life of sailors and their families. The Shipyard plays a critical role in the protection of the sea lanes against increasing military threats and political tensions in the Pacific and will continue to "Keep Them Fit to Fight" in defense of freedom and democracy for years to come.

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PEARL HARBOR NAVAL SHIPYARD: THE INTERWAR YEARS 1919-1941

By Garry Fry

Pearl Harbor Naval Shipyard has proven its worth in combat and in domestic issues over the years, supporting U.S. and foreign vessels alike. The Shipyard's ability to provide support during critical times can be credited to the men and women that worked in the Shipyard, but the facilities and resources that were made available were equally important for operational success. Changes and improvements to the Shipyard, between the end of World War I to the beginning of World War II, were frequent and necessary to adapt to a global pace that was becoming more rapid with technological improvements and innovations. These interwar years would transform the Pearl Harbor Naval Shipyard into a critical repair and overhaul facility for U.S. and friendly naval vessels traveling throughout the Pacific region.

Despite the United States' involvement in World War I in Europe, the Pearl Harbor Naval Shipyard continued to see development throughout to include new hospitals, housing, and high powered communication structures. The year 1919, would prove a pinnacle year in the recognition of strategic importance that the Shipyard held. Chief of Bureau of Yards and Docks C.W. Parks, Secretary of the Navy Josephus Daniels, Rear Admiral J.S. McKean, and Commander J.G. Hilton would arrive in August onboard the USS *New York*. These men, with the exception of the Secretary, would form a "Special Board of Inspection of Naval Bases, etc., on the Pacific Coast" that would recommend on October 10, 1919, that a first class naval base be developed at Pearl Harbor. This recommendation was based on the strategic necessity that was required to provide for an entire U.S. fleet during times of war. With millions of dollars planned towards the growth of the Shipyard, improvements and new buildings came at rapid pace. New and improved machine shops, supply storehouses, power plants, magazines, hospitals, oil-handling facilities, and additional dry docks were all recommended as a part of the board's plan to be ready for any other wartime situation.[i]

With the start of a new decade, 1920 would bring infrastructure previously used in France during World War I. The Shipyard would receive machinery, tools and portable wooden buildings that would form buildings 600-608, 610-618, and 620-624. New considerations were made about the location of hospitals and their proximity to the oil tanks and radio station. Surgeon General W.C. Braisted reported that the in the event of war, the Pearl Harbor hospital would not be tenable.[ii]

The Shipyard would continue to expand with more new buildings and facilities both industrial and recreational. The year 1921 would see the construction of buildings 627-629 and 636, and a tennis court. The hospital would add an administration building, subsistence building, additional wards, and a boiler house. The Housing Committee's John R. Galt would take on the obstacle of housing that was said to deter an influx of mechanics because of scarcity and high rent.[iii] These issues would take side stage to the oil reserve that would require immediate attention for the next several years.

The priority was to create a dependable means of storing fuel oil for the Navy on Pearl Harbor. A contract was made with Pan-American Petroleum and Transport in April 1921, to construct storage tanks for 1.5 million barrels. These thirty 50,000 barrel storage tanks were completed by the end of fiscal year 1923, and were about half full. Another set of contracts were made with Pan American for more storage facilities to support 2.7 million more barrels, with an expected completion date of January 26, 1925. This new order included: seventeen 150,000 barrel fuel oil tanks, one 80,000 barrel fuel oil tank, nine 225,000 gallon gasoline tanks, and fifty-six 25,000 gallon lubricating oil tanks. Not to mention the necessary buildings, pipelines, pumps, electric equipment and wharf that was essential in supporting these massive tanks.[iv]

The Bureau of Yards and Docks would request approximately $2.5 million for fiscal year 1922, as development and expansion continued on the Shipyard. New machine and ship fitter shops were included in the budget along with about a third of the budget going towards extensions. These projects were being planned as others were considered finished such as the 2500 ton marine railway, the decommissioning station for ships at Pearl Harbor, and Sub-station No. 1 being completed by Yard labor.[v] September of 1921, would bring new leadership into the board on the shore establishment of the Navy. These Naval officers, ranking from Rear Admiral to Commander, would

recognize the importance that Oahu held for the United States' military, especially the Navy. This board appreciated the work that had been done throughout Pearl Harbor and its Shipyard and truly recognized the necessity of the hospitals, ammunition depots, mine bases, fuel depots, and radio stations.[vi]

Progress during 1923 would be fairly stagnant with only a few new projects planned. A new board for the Development of Navy Yard Plans was prepared on January 31, 1923, consisting of 13 officers. This board's most significant suggestion would concern the improvements needed in the channel to create a naval base on Oahu. The cost of these dredging and channel improvements, along with several others was estimated at $42.5 million with construction to start in 1925, and end 10 years later.[vii]

The following year, 1924, would see the completion of the massive storage tanks that were ordered back in 1923 with Pan America. On October 28, 1924, the USS *R-1* found reef 3 miles off the coast of Barber's Point. There were no casualties, but because of the rough water, the crew had to be removed while a salvage company towed the boat back to the Yard where it was fixed and back in the water three months later.[viii]

Meanwhile, on August 31, 1925, Commander John Rodgers left San Francisco for Pearl Harbor in PN -9 No. 1 along with PN-9 No. 3. After 300 miles, PN-9 No. 3 was forced to land because of engine difficulty but was towed back relatively quickly. Unfortunately Commander Rodgers in his PN-9 ran out of fuel 200 miles from Oahu and was forced to make a water landing. He spent nine days out at sea surviving on only three days worth of food. He was found floating about 15 miles away from Nawiliwili Bay, Kauai and would survive this incredible ordeal.[ix]

The Yard would continue to turn into a self-sufficient town-like area with more facilities being built such as a general store and pharmacist's quarters. Security would be set in place with fences laid around the main station, fire protection systems being installed in the ammunition store house on Kuahua Island, and a fire engine being purchased.[x]

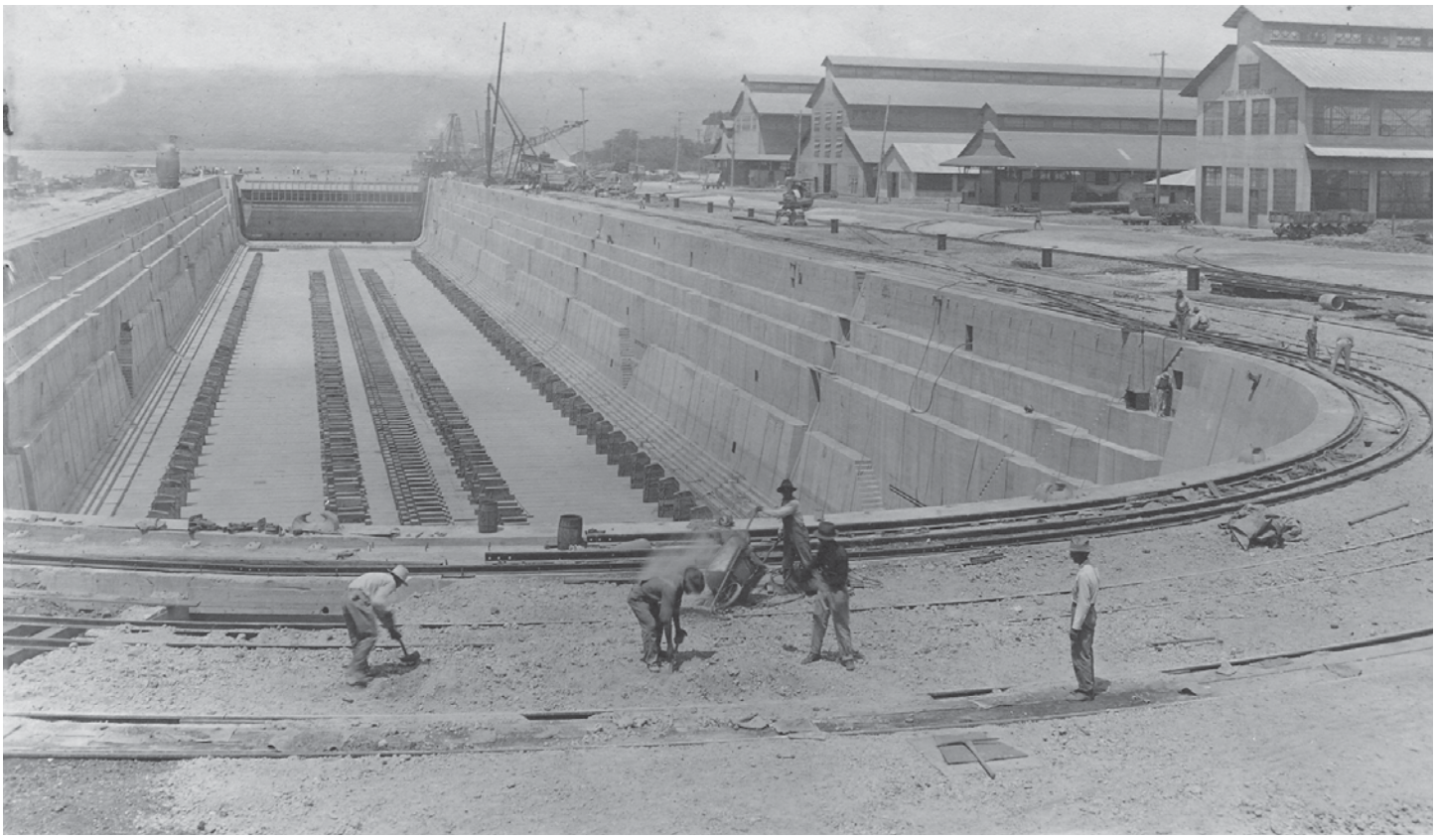
While 1926 was a relatively quiet year, utilities would be addressed with new sewers being placed and telephone switchboards being installed. As always, bids were being taken for new buildings and plans specifically for a sub base and ammunition depot. The ambitious projects at the Shipyard were starting to catch up with it as funds were running short in some areas like the steel building materials that were received but not assembled because of a lack of funds.[xi]

Developmental progress during 1927 would be comparably slower than other years with only plans for submarine base barracks prepared. This 1200-man housing area would also include a subsistence building, laundry, boiler house and distributing system. Other accomplishments could be found in the ammunition depot where lighting and fire protection were installed with other various improvements by Yard labor.[xii]

The year 1928, would host many new construction projects that would be started and finished. But with so many other buildings and other structures standing for several years, maintenance was required to support those pieces of the Shipyard. Painting was completed along the Marine railway, shop buildings, dry dock caisson, along with ballast, fuel, and water tank. The construction of a diesel oil purification plant began and the completion of the First Street pier, hospital quarters, laboratory and animal house all occurred.[xiii] During this entire time the harbor and channel were being dredged by the United Dredging Company and the Hawaiian Dredging Company.[xiv]

The "Graf Zeppelin" would fly north of Hawaii during its flight about the world, August, 1929. This year would also bring improvements to laundry and radio at the Marine barracks with four new radio compass houses built.[xv] The Navy Yard would get a new gasoline steam shovel along with the diesel oil purification plant being completed. Transportation would get a boost with improvements to the railroad tracks and North road. The hospital would continue to benefit with additions made to electric, water, and sewer system. Improvements completed under various contracts included many large buildings being painted throughout the Yard, along with fuel oil tanks, and a 150 ton floating crane. United Dredging Company would complete its responsibility in dredging the harbor and channel on July 11, with Hawaiian Dredging Company finishing November 25.[xvi]

Pearl Harbor Naval Shipyard would see many different vessels pass through its waters during 1930, with submarines arriving at the beginning of March and returning late April, minor Naval exercises taking place in July, submarine operations conducting from 11 July through 12 August, and an informal visitation from the Commander-in-Chief, U.S. Fleet in July.[xvii] Local fishermen of Oahu would find justice with the matter of fishing rights in Pearl Harbor Lochs towards the end of the year on December 9.



Good view of Dry Dock #1 1919. Official U.S. Navy Photo

Congress would also pass a bill to launch the Branch Hydrographic Office in Honolulu, but it was deferred until 1932, when funds were expected to be available. Repairs were done to the fuel and oil lines of pump house #77, the heating plant, and the pier located in Honolulu. New to the Navy Yard were the pistol range and toilet facilities that were installed at the previously existing rifle range. Extensive maintenance was conducted at the hospital's wooden buildings and improvements were made to the roads and electric distribution system of the Marine Reservation.[xviii]

From 1930 to 1933, Rear Admiral Yates Stirling, Jr. served as Commandant on Pearl Harbor.[xix] During these years, the Yard would continue to see change and progression with renovations and new facilities constructed with regularity. Many large changes would occur during Stirling's command with more improvements to the harbor, channel, and waterfront.[xx] The pier and quay wall would be addressed with extensions.[xxi] Dredging operations continued on to remove the Middle Loch shoal. Funds were allocated for industrial plant improvements and foundry extensions in the Navy Yard during 1932. Rear Admiral Yates Stirling, Jr. would be relieved by Rear Admiral Harry E. Yarnell in 1933. Upgrades to the industrial plant would be completed under the National Industrial Recovery Act.[xxii] This act was sanctioned by President Franklin Roosevelt as a part of his New Deal plan, which was intended to stimulate the economy during the Great Depression.[xxiii] Tragedy would strike the Navy Yard power plant involving a casualty during the operation of a turbo alternator located in Central Power Plant Building No. 8. The rotors of the turbine rotor were replaced, but more importantly, the issue of the power plant's insufficient capacity and physical conditions was addressed by the Bureau of Yards and Docks. Their solution involved a completely new power plant at another location.[xxiv]

Funds granted by the National Industrial Recovery Act were still being put to use during 1934. The newly purchased 200-ton Hammerhead Crane arrived from the New York Ship-building Plant in Camden, N.J. where it was once used. The crane would operate on the west quay wall of the repair basin where the Hawaiian Dredging Company continued to work under contract. The National Industrial Recovery Act would also grant funds for three 15-ton cranes and one 50-ton crane to be used under contract at the repair basin.[xxv] Funds from the NIRA would also be used

to carry out more extensive dredging in the West Loch channel, build a bachelor officers' quarters and a general facilities building.[xxvi] Dredging continued through 1935 where $2.8 million was spent on waterfront construction. West Loch dredging standards were set at obtaining a 1000 ft. width entrance channel with minimum of 45 ft. depth at the bar sections and a minimum of 40 ft. depth everywhere else. Five dredges would be involved through the 1935 dredging effort.[xxvii]

Millions more would be spent on the dredging effort in 1936, in the amount of $3,000,000. The obstacle of clearing out 4.5 million cubic yards of material was required to obtain the goal of a 1000 ft. width channel. Smaller amounts of money would be spent to provide fresh water to the Pearl Harbor area using an underground tunnel near the Aiea Naval Reservation. More housing for Pearl Harbor's military would be initiated with plans to house 80 Chief Petty Officers and 1052 men with a $310,000 contract for officers' quarters.[xxviii] Money from the Recovery Act would still be used in 1936 to finance miscellaneous developments at the cost of one million dollars.[xxix]

The year 1937 would continue to display a serious dredging effort throughout Pearl Harbor. Hellgate, the 8 cubic yard dipper dredge, was purchased for $100,000 to help remove another two million cubic yards of material. New construction projects included East Wing, Navy Yard Administration Building 1, Navy Yard Dispensary Building No. 140, a garage and dispensary. The Army wharf at Fort Weaver had to be replaced due to the re-alignment of the Pearl Harbor Channel under Navy contract.[xxx]

In 1938, work that began in 1936 to supply Pearl Harbor with fresh water from Aiea was improved at the price of $280,000 to supply additional pipelines, pumps and backup electric generating plants at the Aiea wells' pumping station. Small amounts of development occurred during the following year, 1939, with improvements to the bachelor officers' quarters, dredging operations, and mooring installations. Pearl Harbor Naval Shipyard was finally becoming somewhat stable during the later 1930's with the obvious decrease in new activity and projects. That is until war began to look more likely as 1941 drew closer. The year 1939, was a relatively slow year in terms of Shipyard development with only regular maintenance and the continuation of dredging out the channel.[xxxi]

The beginning of a new decade would bring the Shipyard some much needed relief with the approval of funding for Dry Dock #2. In addition to plans for another permanent Dry Dock, a floating dry dock would arrive from New Orleans and become operational November 8, 1940. The basin the floating dry dock would be set in, required an additional four million cubic yards of dredging running about $600,000.[xxxii] Approximately one million more dollars was spent dredging out the East Loch, where half a million cubic yards of materials was removed. Congress approved an $18,000,000 contract for the construction of naval facilities, Pearl Harbor, and other locations.[xxxiii] A total of 560 acres was purchased in two spurts, the first being in 1939, where 335 acres were purchased and the second in 1940, with the last 225 acres being purchased. These areas would become housing areas I, II, and III. With the arrival of the new decade, 1940 would be one of Pearl Harbor's most active years with over $32 million dollars of public works appropriations with a possibility of another $50 million dollars in the near future. For use of these funds, the priorities were dredging out the basins of Dry Dock #2 and #3, a new power plant, and new dredging and mooring facilities.[xxxiv]

More and more was being demanded of the Shipyard with an increased number of ships scheduled for overhaul to include cruisers, destroyers, submarines, and auxiliary facilities. Improvements were a constant priority to keep up with the growing demands that were required of workers, their facilities and their tools. Civilians working in the Shipyard constituted about 3,300 employees June 30, 1940. A year later, that number had more than doubled to 7,300 employees. This increase in employees was thanks to a heavy recruiting effort from mainland United States which resulted in 1,500 new employees joining the Shipyard. Money set aside for the dredging of Dry Docks #2 and #3 was finally being put to use by the Pacific Bridge Company. Power plant building No.149 had been completed with four new turbo-generators supplying the area with 19,000 kilowatts of power. Precautions to meet future industrial demands were set with the addition of air compressors. Unfortunately, many of these improvements and facilities would come too early as the attack on Pearl Harbor by the Japanese would destroy some of these important pieces of the Shipyard.

Time, money, and hard work spent on the Pearl Harbor Naval Shipyard during the interwar years of 1919 to 1941, were essential to bring the Shipyard up to date in order to provide the necessary facilities required to perform any task on naval vessels, foreign or domestic. The years between the World Wars were a different time that may be difficult

to comprehend. Feats that seem simple today, such as successfully flying across the Pacific Ocean, put into perspective the technological limitations the people of the interwar years were working under, to include the men and women of the Shipyard. Many of the original buildings still exist, a testament to the craftsmanship and importance of each building and facility that has served its purpose for over half a century. Even with current events not involving naval forces as much in a traditional fashion, the importance of the Shipyard at Pearl Harbor has not dissipated. Even with technology at its finest, 100 years later, the trip across the Pacific Ocean is still a formidable undertaking. While Pearl Harbor Naval Shipyard is a national asset that may be overlooked or taken for granted, its presence, functionality, and location are all characteristics that would be more appreciated if one day the Shipyard was closed. Keeping up with the times now is just as vital to performance as it was during the interwar years. The constant improvements made throughout Pearl Harbor can be linked to the Navy's ability to get back on its feet after the devastating attack on December 7, 1941, and push the enemy back into defeat.

Notes

[i] A Brief of the History of Pearl Harbor in its Relation to the U.S. Navy, 1842 to Nov. 1941. Compiled to 1928 by L.M. Stevens (CAPT USN), to 1941 authors unknown. Reprinted for 75th Anniversary in 1983, Pearl Harbor Naval Shipyard Archives, 17.

[ii] Ibid, 19.

[iii] Ibid.

[iv] Ibid, 20.

[v] Ibid, 22.

[vi] Ibid, 23.

[vii] Ibid, 24.

[viii] Ibid, 25.

[ix] Ibid.

[x] Ibid, 26.

[xi] Ibid, 26-27.

[xii] Ibid, 28.

[xiii] Ibid, 28.

[xiv] Ibid, 29.

[xv] Ibid, 29.

[xvi] Ibid, 30.

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[xviii] Ibid, 31.

[xix] Ibid, 30-32.

[xx] Ibid, 32.

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[xxii] Ibid, 32.

[xxiii] Roosevelt, Franklin D. "National Industrial Recovery Act (1933)." *Our Documents.* http://www.ourdocuments.gov/doc.php?flash=true&doc=66 (accessed March 18, 2008).

[xxiv] A Brief of the History of Pearl Harbor in its Relation to the U.S. Navy, 33.

[xxv] Ibid.

[xxv] Ibid, 34.

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[xxx] Ibid.

[xxxi] Ibid, 36.

[xxxii] Ibid, 36-37.

[xxxiii] Ibid, 37.

[xxxiv] Ibid.

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THE NAVY YARD ON DECEMBER 7TH 1941: JAPANESE STRATEGY AND A NEW PERSPECTIVE

By Adam Lausch

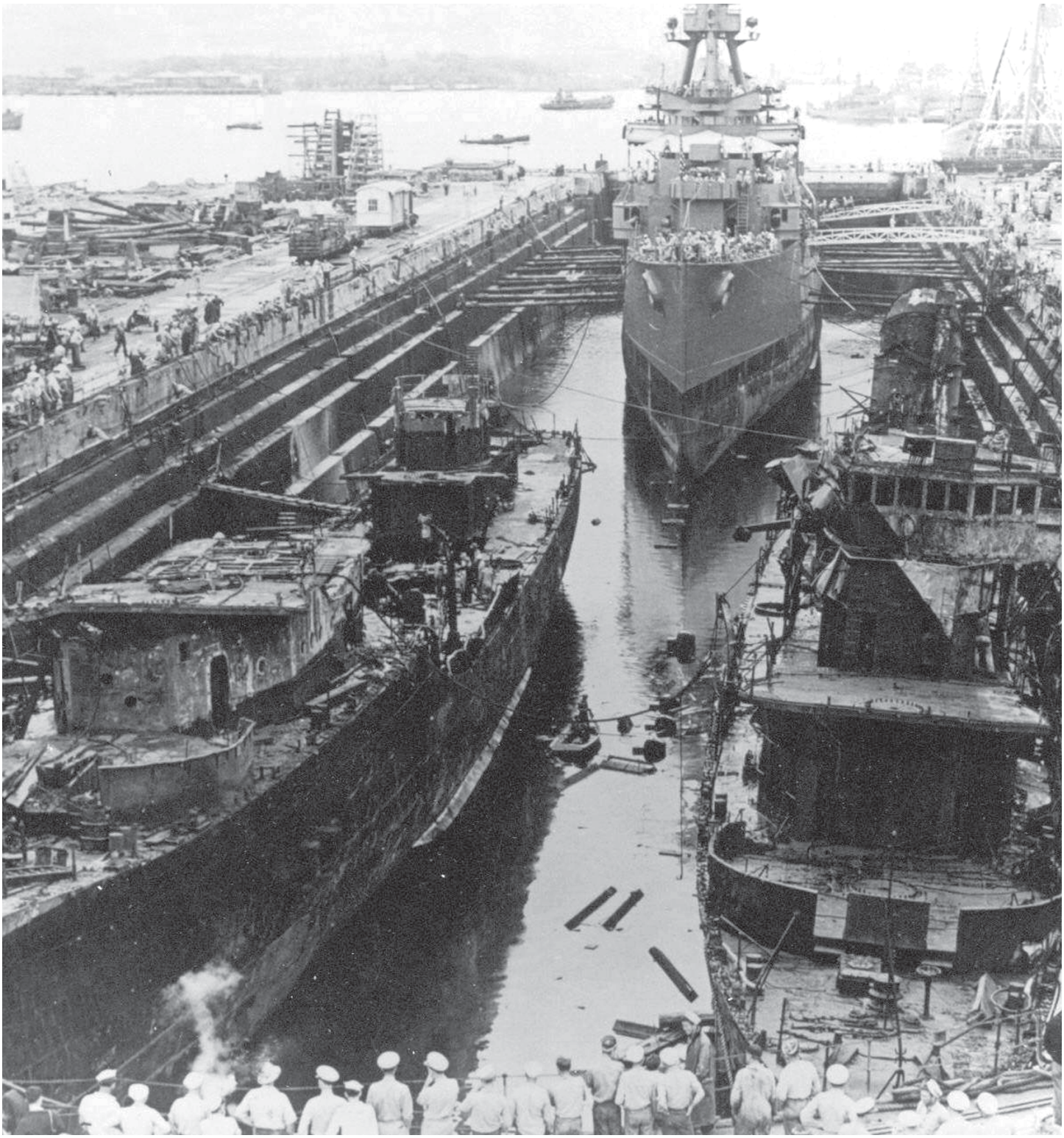
Pearl Harbor Naval Shipyard was integral to wartime readiness and salvage operations that took place immediately following Japan's infamous attack on Pearl Harbor. However, few know of its place in history during the attacks on December 7, 1941. The Shipyard has its destined place in history for that awful day. We all know December 7 as a symbol that woke a sleeping giant and brought the United States out of isolationism forever. It mobilized not only the U.S. Navy and military forces; it mobilized a proud people who would never forget what the Japanese had done that day. Pearl Harbor Shipyard is probably best remembered for its role in months to come following the attack. What was its role during the actual attack and why was it important to the Japanese? Pearl Harbor itself and the surrounding facilities were a gold mine tactically for the Empire of Japan. Japan tried to severely cripple the U.S. Navy in the Pacific and to cripple the U.S. ability to effectively repair and salvage warships. The Shipyard itself was a piece of that strategic goal which should not be forgotten.

Accusations surround the attack when pertaining to preventative measures. Could Pacific Fleet (then CINCPAC) take initiative from what they saw as pertinent intelligence? Hindsight is 20/20 in these matters as we strive to use history as a teaching tool to prevent disasters such as Pearl Harbor from ever rearing their ugly heads again. Retired intelligence officer Edwin T. Layton recounts his horror as he arrived at the Shipyard from his home in Diamond Head, "Smoke billowed skyward as we approached the naval base…our police-guide veered off the highway and led us bumping and bouncing over a rough stretch of terrain and into the navy yard just as the second wave of Japanese planes came screaming in."[i] Layton also expressed his grief wholeheartedly because he felt somewhat responsible as the Japanese planes were showering in. So many would bear witness to the horrific sight that was December 7, 1941. Most notably, for the purpose of this chapter, the crew and commanders that witnessed the bombing of Dry Dock #1 and the floating dry dock at the Navy Yard.

It is clear that the Japanese intended to wreak serious damage on the U.S. Navy's Pacific Fleet. Moreover, what the Empire targeted is important to explore as well. More than 90 ships were present at Pearl Harbor that day.[ii] Battleship row was full, which played perfectly into Admiral Isokuru Yamamoto and Vice Admiral Chuichi Nagumo's plan. Yamamoto sought to neutralize the threat of U.S. forces in the Pacific before anyone expected an attack or the U.S. could mobilize. Additionally, the Japanese aspired to destroy any aircraft carriers stationed at Pearl Harbor. Fortunately, no carriers were present at the base. USS *Enterprise* and USS *Lexington* were conducting aircraft delivery missions to satellite facilities while USS *Saratoga* was on her way back to the West Coast for maintenance.[iii]

Naval warfare was approaching a change in doctrine just prior to the Pearl Harbor attacks. Battleships had long been the means for naval power projection and warfare at sea. However, change was imminent as aircraft carriers and naval aviation were the wave of the future. Japan held carrier aviation to a high standard and what they planned to do at Pearl Harbor had never been done before. The mass air assault by means of aircraft carriers had never been assembled in such great concentration as was done on the morning of December 7. In complete secrecy, Task Force commander Nagumo's fleet rendezvoused at Tankan Bay before transiting out of merchant visibility and outside of Pacific shipping lanes.[iv] The Japanese launched two waves of planes from a force of six aircraft carriers. The first wave was launched at approximately 0600 hours and consisted of 181 planes. The second wave consisted of a similar amount, 170 planes, and was launched at Pearl Harbor at 0630 hours.

Interestingly, the Japanese attack force consisted of five midget submarines launched from their respective mother sub with the intent of causing further disruption in the harbor. Early in the morning at 0342, the lookout watch aboard a patrol craft spotted a periscope in the moonlight near Keanpapuaa Point. His report was not in vain as the minesweeper *Condor* immediately turned its course to the sighting, but was unable to locate what was reported as a possible submarine.[v] The first indication of the Pearl Harbor raid was witnessed by duty patrollers off the island. Unfortunately, the U.S. Navy patrollers were not in a position to act and yet occurred another tragedy of that fateful day. These early warning occurrences, to include the RADAR warnings and the eventual sinking of a midget sub-



Cassin, Downes, and Pennsylvania in Dry Dock #1 shortly after the attack. Official U.S. Navy Photo

marine by USS *Ward* near the harbor entrance, were not enough to prepare all the military facilities on Oahu for what was to come. None were prepared.

What was the naval Shipyard's role in history during that day? In order to gain a perspective of what was important to the Japanese, one has to turn his/her attention to Dry Dock #1. Battleship USS *Pennsylvania* (BB-38) was undergoing repairs inside the aforementioned dry dock. Directly behind it were two destroyers, the USS *Cassin* and *Downes*. In the floating dry dock, positioned at the inlet to the channel, sat the USS *Shaw.* The Japanese attacked key facilities all over the island, and the attack was extremely calculated in nature. The first wave of planes seemed to put much of their focus on battleship row. As it turned out, they were successful in their objectives. Seven out of eight battleships at Pearl Harbor were positioned along Ford Island. The eighth, *Pennsylvania,* was across the channel in Dry Dock #1. The Navy Yard was not spared any fury from the attack. The Japanese fully intended on striking any dry dock which contained a warship; they found three in Dry Dock #1. Because of this, the second wave of attackers would pay special attention to the Navy Yard.

The Yard was of special strategic importance to the Japanese. If they could cripple yard workers from performing salvage duties, they would at least attempt to do so. *Pennsylvania* was also strategically important because it was the only battleship not in position on the row. Approximately five high bombing attacks took place directly over the position of Dry Dock #1 according to the commanding officer, USS *Pennsylvania,* C.M. Cooke.[vi] During this time, the crew actually manned the anti-aircraft guns. The crew of BB-38 had time to react, in that there was sufficient time between the two waves of planes. Cooke also states, "All bombing attacks were fired upon by all batteries. Five inch bursts appeared to be accurate, but later it was estimated that fuse settings were too short and that the bombing formation was not being reached, perhaps by several thousand feet."[vii]

Cooke references first call to colors, and immediately following Cooke and his crew heard blasts from across the harbor at the tip of Ford Island. Shortly afterwards, condition "YOKE" was set and the crew manned their battle stations at 0802. The crew witnessed torpedo hits on the smaller minelayer (CM) *Ogala* and the light cruiser (CL) *Helena*. It was obvious at this point Pearl Harbor was under vicious air attack. Cooke and his crew began firing at 0805.[viii] This was an unbelievable response time for a crew. It is particularly remarkable due to BB-38's location in dry dock in a position which made it difficult for her crew to defend the vulnerable warship.

Unknown to the crew until after the fact, their anti-aircraft efforts were in vain. In another interesting eyewitness account, Cooke references the USS *Nevada* underway near the mouth of the harbor. He elaborates, "…the *Nevada* was observed to be getting underway and reached a point about on the *Pennsylvania's* starboard quarter, distant about 600 yards when a dive bombing attack was observed approaching the *Pennsylvania* on the port bow…10-15 planes coming in succession, at low altitude."[ix] The crew thought these planes were heading directly for Dry Dock #1. At the last minute, the planes broke off and continued to bomb the *Nevada*. It was not until approximately 0900 those Japanese planes would do their worst to the Navy Yard.

Of the high altitude bombing attacks which took place, the second and third successions of planes did the most damage to Dry Dock #1 and the surrounding area. Pennsylvania was hit directly by one 500 pound bomb which featured a delay in detonation. Cooke recalls his ship was hit by this particular bomb at 0907.[x] The result was devastating, but not critical to the life of the ship. It did cause the death of 26 enlisted sailors and two officers who were carrying out duties below deck. A ship such as BB-38 lived to fight another day, but the lives of these men should never be forgotten. Incredibly, work to repair BB-38 began at 1400 on December 7. Both Shipyard workers and crew members began repairing *Pennsylvania* immediately.[xi]

During the second wave of Japanese attack planes, it appears the Japanese switched their focus. Battleship row was in complete disarray. *Arizona* had sunk. *Utah* and *Oklahoma* capsized. *West Virginia*, *California*, and *Nevada* had all suffered considerable damage. The second wave of planes was more focused on the Yard. This suggests the Yard was not necessarily a primary target at the onset of Japan's raid but it did become a primary target after Japan felt it succeeded on battleship row. The destruction which took place at the Navy Yard should not be forgotten. It was once again clear the Japanese intended to further cripple the Pacific Fleet by attacking ships while in dry-dock. Many sailors felt this was the ultimate act of cowardice.

As previously mentioned, two destroyers were located directly in front of BB-38. These two ships sustained more damage than most at the Pearl Harbor. Like *Pennsylvania*, their crews were able to man battle stations while in dry dock. Most notably was what occurred on USS *Downes*

(DD-375) after it was struck multiple times. Incendiary bombs would lead to the ultimate destruction of *Downes.* These bombs struck the dry dock close to the time which *Pennsylvania* was hit. Commander W.R. Thayer recounts the horror that took place on his beloved ship.

The story of *Downes* and her crew is a remarkable testament to courage and a sailor's pride for his ship. In an odd but not rare occasion; both the commanding and executive officers were not on board *Downes* when the attacks occurred. They were on approved liberty out in town, a pass time of many senior officers during this era. Many enlisted and junior officers did not have nearly as much opportunity to leave the ship. The tone of Lieutenant Commander (LCDR) Thayer is apparent within his after action report. One can gather the CO would have wished to join his men while they defended the ship. On December 7, Lieutenant Junior Grade (LTjg) J.D. Parker would lead his crew in countless heroic acts. Most of the eyewitness accounts on *Downes* came from Parker while CO W.R. Thayer put it to paper.

On the morning of December 7, 142 enlisted and five officers occupied USS *Downes*. At 0755, watch standers noted incoming planes. Chief Petty Officer of the watch immediately notified LTjg Parker the planes appeared foreign and hostile. With that indication, the crew was called to general quarters.[xii] The Navy Yard supplied electricity to ships while in dry dock and subsequently that power was lost at approximately 0810. *Downes* was a sitting duck at this point. Chief Electrician's Mate (EMC) Reidy realized the issue at hand and rushed to start the ship's diesel generators.

Ammunition was a problem for the *Downes*. Due to lack of power, the crew of Downes literally handed 5" shells to one another in a human chain. This was the only way ammunition could reach the main decks without a hoist. Two magazines of machine gun ammunition were "borrowed" from *USS Cassin* (DD 372) which stood adjacent Downes.[xiii] Thayer expresses his pride in writing as it took only 15 minutes before machine guns were firing fore and aft at the enemy.[xiv] Chief Raidy among others were able to return power to the ship at 0823. Now the crew would be able to hoist shells up to deck levels.[xv]

Like *Pennsylvania*, *Downes*' crew must have been quite intimidated by the consistent waves of bombers seemingly headed directly towards them. However, *Downes* was not touched the full first hour of Japan's air raid. Her moment in history was soon to follow. During that first hour Thayer

Destroyer USS Shaw explodes in floating dry dock, Dec. 7, 1941. Official U.S. Navy Photo

reports, "The first attacks were made by torpedo planes against the battleships. These were followed a few minutes later by horizontal bombing attacks…the *Downes* opened fire with machine guns, but the range was too great for effectiveness and fire was eventually stopped."[xvi]

Although machine gun fire commenced, *Downes* was unable to ready her main guns quickly. This was of course due to the power loss during the earlier stages of the attack. Soon after power was restored, gun number three was made ready and loaded by hand at about 0845. During this whole time, LTjg Parker was in control of every single evolution on *Downes*.[xvii] He controlled all firing evolutions from the bridge. Shortly before 0900, the Navy Yard began preparations in order to flood the dry dock. This was before any bomb touched Dry Dock #1. Parker gave the okay to the yard workers *Downes* was ready and secure if the dock needed flooding.

This was when at least three dive bombers began their descent on Navy Yard. As stated before, it appeared strategically Japan intended to destroy as many battleships as possible. It can not be discounted that Dry Dock #1 and its surrounding facilities became a target of opportunity. What did it matter if the Japanese could hit the dry dock itself? What if they were able to destroy other critical nodes such as machine shops, cranes, and repair facilities throughout the Yard? Once again, the Yard became a focal point for Japan's dive bombers, following the first full hour of attack.

Downes readied gun number three, and got off one shot

when those three dive bombers approached the dock. Just before the turn of the hour at 0857, one of the bombers dropped an incendiary bomb. This particular bomb landed directly in-between both USS *Cassin* and *Downes*.[xviii] The fire that ensued would eventually set both destroyers ablaze. The incendiary fluid was described by deck hands as displaying a yellowish-green color. Hoses were activated on the Downes and immediately put to the fire. It was found the water actually spread the fluid and thus the fire as well.[xix]

Only 15 minutes passed when enlisted and officers both realized the fire was completely out of control. Parker ordered the engine room abandoned at 0912.[xx] Eight minutes later, Parker gave the order to abandon ship. Witnesses say many of the men had already begun to jump. This was because many sailors were trapped on the stern of *Downes* by a wall of flames. Parker was the last to leave *Downes*. Another bomb struck the bridge as the Japanese planes dove down to strafe men as they escaped the dry dock.[xxi] Such instances displayed by the Japanese during their attack on Pearl Harbor left an infuriating impression on the minds of most Americans.

Unparalleled courage was displayed by USS *Downes*' sailors. Many were injured and would remain on the side of the dry dock to fight fires on their ship. It is a miracle not more were killed. Like *Arizona*, *Downes* suffered an inexplicable explosion. Warheads on *Downes*' torpedoes would eventually succumb to the heat and explode. This explosion ended the life of DD-375 and USS *Cassin*. Dry Dock #1 was eventually flooded, but not until all ships were abandoned. One wonders why the dock was not flooded sooner, but hindsight is always 20/20 regarding these issues.

Both *Cassin* and *Downes* were declared complete losses shortly following the attack. LCDR Thayer continued in his after action report to declare over 20 sailors who did their ship meritorious service. Most notable was probably LTjg Parker, the unfortunate officer on duty Sunday morning December 7. Little did he know his ship would go down in flames so quickly while in dry dock. The amount of casualties was not included on Thayer's report, although it is known at least two sailors died following the explosion of the first incendiary bomb dropped between the two destroyers.[xxii] Men aboard the *Downes* must have felt completely helpless to witness their own destroyer go down in flames without a fair chance to defend her at sea.

Many Shipyard workers bore witness to the second wave which crippled the Yard. V.F. Michael, a former electrician for Shop 51, recounts his experience, "The two cans had received bomb hits and were on fire." Here he is referencing both Dry Dock #1 and the floating dry dock. The terror that ensued after the docks were hit must have been incomprehensible. He continues, "Someone finally found the adapters and we connected the (fire) hoses to the hydrant…soon after that, the *Downes* magazine exploded. The concussion lifted all of us up in the air."[xxiii] Shop 72 progressman Edward Galovic had a near-death experience, "I was at my shop about twenty minutes after the attack began, and I noticed that ships in No. 1 dry dock had been hit and were burning furiously. They were the two destroyers, *Cassin* and *Downes*." In his next passage, he is probably noting the explosion of *Downes*' torpedoes within their tubes. When the explosion happened, Mr. Galovic found himself too close. "It seemed like the *Pennsylvania* was firing her forward anti-aircraft guns directly over our heads…a little while later the dry dock exploded in my face…when I picked myself up I was facing the front entrance of my shop. A stream of blood rushed from my throat."[xxiv] Ed Galovic would eventually lose consciousness and later come to find out he had lost four quarts of blood. The doctor informed him he did not know how he was alive after losing that much blood.

The perspectives through countless eyes near or actually present inside Dry Dock #1 gives an all-encompassing account of one common horror. One aspect which remains remarkable is the lengths that both sailors aboard ill-fated ships and Shipyard workers who tried so hard to save each other and their precious warships went to in order to save the ships. Yard workers were finally able to control the dry dock fires later in the afternoon. Although both destroyers in Dry Dock #1 had their careers put on hold for years, *Pennsylvania* would return quickly to fight another day in the Pacific theater. Dry Dock #1 would also be repaired and subsequently used throughout the war and for years to come.

The Navy Yard at Pearl Harbor is probably best known for its call to duty following the destruction of December 7, 1941. Salvage operations conducted on battleships such as *Nevada*, *West Virginia*, and *California* would significantly alter the endgame for naval superiority in the Pacific. That said, we must not forget what took place at Pearl Harbor, because the Navy Yard from that point on became a symbol for American ingenuity. Like many other facilities which increased wartime production, the Yard would represent a fighting spirit for Americans all over the United States. This

symbolic representation will carry on for centuries to come. The Yard is special because it not only was at the forefront of the war effort; it bore witness to the very beginning. The Yard would help the U.S. emerge as a world power following the war; not many organizations can take credit for an event like that. Pearl Harbor Naval Shipyard is a national icon, a symbol, and a historical treasure.

Notes

[i] Edwin T. Layton, *And I Was There: Pearl Harbor and Midway – Breaking the Secrets* (New York: William Morrow and Company Inc., 1985), 18.
[ii] Department of Defense. 50th Anniversary of World War II Commemorative Committee. *Pearl Harbor: 50th Anniversary Commemorative Chronicle, "A Grateful Nation Remembers" 1941-1991*, http://www.history.navy.mil/faqs/faq66-1.htm
[iii] Naval Historical Center. *Pearl Harbor Raid, 7 December 1941 – Overview and Special Image Selection*, http://www.history.navy.mil/photos/events/wwii-pac/pearl-hbr/pearlhbr.htm
[iv] Ibid
[v] Layton, 301
[vi] C.M. Cooke, Commanding Officer, USS *Pennsylvania*, *USS Pennsylvania's Report of Action During Enemy Air Attack Morning of Sunday, 7 December 1941* (Washington, DC: Naval Historical Center, 1941), 2
[vii] Ibid
[viii] Ibid
[ix] Ibid
[x] Ibid, 4
[xi] Ibid, 6
[xii] W.R. Thayer, Commanding Officer, USS Downes, *Report of Action with Japanese Aircraft during Attack on Pearl Harbor, December 7, 1941* (Washington, DC: Naval Historical Center, 1941), 1
[xiii] D.F.J. Shea, Commanding Officer, USS *Cassin*, *Air Attack on Pearl Harbor, December 7, 1941* (Washington, DC: Naval Historical Center, 1941), 2
[xiv] Thayer, 2
[xv] Ibid
[xvi] Ibid, 3
[xvii] Ibid
[xviii] Ibid
[xix] Ibid
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[xxi] Ibid
[xxii] Ibid, 6
[xxiii] V.F. Michael, "Walking through Hell with a Blue Flashlight," *Shipyard Log Special Commemorative Edition*, December 7, 1991, 5.
[xxiv] Edward Galovic, "Back from the Dead."

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RAISED FROM THE DEPTHS:
THE SALVAGING OPERATION OF THE USS OKLAHOMA

By Kyle Cox

The sound of thunder echoed over Pearl Harbor, except there was not a cloud in sight on the morning of December 7, 1941. The sound was that of torpedoes and bombs that were being dropped by the Japanese Imperial Navy with a surprising and brutal attack on the United States Pacific Fleet stationed at Pearl Harbor. The ships that were berthed along battleship row were sitting targets of this deliberate attack. Though the USS *Arizona* is the most remembered and revered battleship lost in the attack, the *USS Oklahoma* is the most horrifying.

To witness the fate of the *Oklahoma* was the crowning horror of the day, worse even than the volcanic eruption aboard the *Arizona*. The explosion of a battleship, although an awesome thing, was comprehensible. It even had a certain tragic human dignity. But for a battlewagon to overturn was unthinkable; it affronted human dignity.[i]

To free the *Oklahoma* and her crew from the fateful grave of the dark and oil-covered waters of Pearl Harbor would prove to be a rescue and engineering feat that the world had never laid eyes on. The divers, salvage workers, and engineers of the Pearl Harbor Naval Shipyard would prove their mettle in years ahead.

The USS *Oklahoma* was built as a *Nevada* class battleship at the naval shipyard in Camden, New Jersey. Its keel was laid on October 26, 1912. Upon completion of the build, she was launched into the water on March 23, 1914, and received her commission into service on May 2, 1914. The *Oklahoma* started her tour of duty in the Atlantic Fleet based out of Norfolk, Virginia. This service with the Atlantic Fleet afforded the *Oklahoma* some valuable combat experience. She was put into action protecting convoys in European waters in mid-1918. The *Oklahoma* also had the distinction of escorting President Woodrow Wilson across the Atlantic Ocean in 1919, on his journey to and from France.[ii] Upon completion of the *Oklahoma*'s tour of duty in the Atlantic, she was reassigned to the Pacific Naval Fleet based out of San Diego, California in 1921. During this time the *Oklahoma* participated in numerous naval exercises including the Pacific Battle Fleet's trans-Pacific cruise to Australia and New Zealand during 1925. While still being assigned to the Pacific Fleet, the *Oklahoma* was moved to the Philadelphia Navy Yard 1927, for major upgrades and modernization to its hull, defenses, and armaments. She did not return to active service until 1929, once all the modifications had been made. The next action the *Oklahoma* saw after upgrades came in 1936, when she was sent to Spain to help evacuate American citizens, during the Spanish Civil War. Once finished with this task, she went back to San Diego until 1940 when the United States Navy decided to move the Pacific Battle Fleet from San Diego to Pearl Harbor, Hawaii.[iii] This is where the *Oklahoma*'s fate changed and she became a ship in danger.

While stationed at Pearl Harbor, the *Oklahoma* became involved in one of the most tragic and deliberate attacks on United States military forces by a foreign adversary. The attack on Pearl Harbor on December 7, 1941, changed the face of history and became known to President Franklin D. Roosevelt "a date which will live in infamy." At 0800 on that Sunday morning the Japanese Imperial Navy launched an air attack on the United States Pacific Fleet based at Pearl Harbor, specifically targeting the massive battleships that were berthed along battleship row. The *Oklahoma* was tied up at berth F-5, outboard of the *USS Maryland*; this left the *Oklahoma* exposed to the torpedoes being dropped by Japanese fighters attacking the ships.[iv] By being exposed to torpedo hits on her port side, the *Oklahoma* was doomed to the watery grave that was awaiting her and her crew. There has been debate on exactly how many torpedo hits the *Oklahoma* took. Some survivors say three torpedoes hit in a matter of 3 minutes, other survivors say she took five hits and some estimates state that seven torpedoes slammed into her portside.[v] According to Adolph M. Bothne, a boatswain aboard the *Oklahoma* when she was attacked "a third torpedo hit in the middle of the ship, and the ship started to list noticeably."[vi] As the *Oklahoma* continued to list rapidly to her port side from the first three torpedoes, two more torpedoes struck her either on or above the armor belt causing her shell to cave in and leading to the fate that awaited her.[vii] With the *Oklahoma* listing far to her portside it was just a matter of time before she went turtle and rolled completely over trapping the crew in a steel grave. As she continued to roll the men inside of her were driven into confusion. Stephen B. Young, a seaman that was trapped inside of gun turret number 4 recalls the final seconds as

USS Oklahoma being righted. Official U.S Navy Photo.

the *Oklahoma* rolled over in the waters of Pearl Harbor:

"Those of us who were left behind down in the powder handling room during those final seconds when the ship capsized were not aware at first that she was turning turtle. The darkness there was wild and confusing with objects of all descriptions being tumbled and thrown about. As we frantically fought to save ourselves, we became disoriented. I felt the ship lurch. The deck slipped out from under me and my hands snatched at empty air. I was tossed and spun around, pitched into great nothingness, suspended in air…All of us the living, dying and the dead-were whirled about…Then the dark waters closed in over me as the ship came to rest-upside down on the bottom of the harbor…I was surprised to find myself alive."[viii]

With the *Oklahoma* capsized over 150 degrees to her port, she was resting on the bottom of Pearl Harbor with her masts and superstructure buried in the mud, and the bottom of her hull sticking just above the water. With the sight of the *Oklahoma* capsized at berth F-5, the civilians and sailors from the Pearl Harbor Navy Shipyard mobilized and reached the *Oklahoma* and began rescue operations by 0915, while Japanese fighters were still overhead. These rescue efforts were led by the *Oklahoma*'s damage control officer William H. Hobby, who was not on the ship at the time, along with the trapped sailors whose tapping on the bulkheads of the *Oklahoma* would also guide rescuers. Hobby immediately ordered that equipment be brought to cut the men out of the ship and try to rescue as many as the survivors still trapped inside as possible. With this order, oxygen-acetylene torches were brought from the destroyer tender, Rigel and air powered saws and drills were brought from the Navy Yard.[ix] Efforts were made to free the survivors by first cutting three entry holes with the cutting torches into the hull of the *Oklahoma*. The holes were cut in the amidships area, the feed water tank and the fire room. These openings allowed the rescue team to reach some of the sailors trapped inside and free them from the metal hulk that surrounded them. Though the oxygen-acetylene torches proved to work great for cutting through the thick metal skin of the hull, they were abandoned as a rescue tool after it was discovered that they produced toxic gases. With two sailors trapped in the evaporator pump room, efforts were made to keep them alive until they could be cut out and pulled to the surface. To achieve this, a discharge line was run down so that food and water could be passed to them in order to help them survive until the rescue team could arrive. At 2300 on December 7, 1941, a hole was finally cut into the evaporator pump room using the oxygen-acetylene torches. However, when the rescuers reached the sailors, they found them dead due to suffocation. Apparently the oxygen-acetylene torches produced fumes that were toxic as they cut through the hull and caused the sailors to perish. From that point on no oxygen-acetylene torches were used to free survivors.[x] Further efforts to free the trapped men were made only using air powered tools such as saws, drills, and jackhammers to bust of the rivets off of the hull. Rescue efforts on the *Oklahoma* continued until December 9, 1941, when the final survivors were freed at 0230, bringing the total to 32 rescued. The rescue team had no idea at that time how many men were left trapped inside the ship, but no more survivors were to be pulled from the tomb of the *Oklahoma*, 415 would make the ultimate sacrifice.[xi]

Now came the task of what to do with the *Oklahoma* as she lay overturned in Pearl Harbor. There was a debate of whether to salvage her immediately and put her back into action or to wait and allow the other ships that were less damaged to be salvaged. Upon further inspection of the damage to the *Oklahoma*'s hull, the engineering, and manpower that were needed to roll her over, it was decided to salvage the lesser damaged ships first and hold off to salvage the *Oklahoma* until the end. Captain Homer H. Wallin, Battleforce Engineer, at Pearl Harbor wrote:

"My reason for not indicating the *Oklahoma* in the near-term program is that righting her is likely to prove a very extensive job, and I question whether the salvaging of the vessel warrants a diversion of forces, and materials which would be required to do the job. After she is righted there would be a big job of further salvage and reconditioning to get her into service. I do not question, but that this can be done but would require a year or more of time in addition to the talent of working forces mentioned."[xii]

Upon hearing this recommendation from Capt. Wallin, the Pacific Fleet Commander pushed the salvaging and righting of the *Oklahoma* to the back burner, along with the USS *Arizona* and the USS *Utah*. Then in May, 1942, the Department of the Navy finally reached a point where they desired a salvage operation on the *Oklahoma*. During this time arrangements were made with the Pacific Bridge Company, the contract company that was involved with the Pearl Harbor Naval Shipyard and the salvaging operations of Pearl Harbor. These arrangements divided the work among the Navy and Pacific Bridge Company. It also allowed time for the company to secure the manpower and

materials that were going to be required to right and re-float the *Oklahoma*.[xiii] The first step was to right the *Oklahoma*, or roll her back over upright. This was going to be no easy task and an engineering nightmare. Admiral William Calhoun, head of the salvage division at Pearl Harbor noted, "To turn such a mass back through 150 degrees is an engineering feat of considerable magnitude which will require careful planning and thorough preparation."[xiv] The job of planning the righting operation and performing the actual task fell to the Pacific Bridge Company because they had the experienced engineers to attempt such a feat. So on July 14, 1942, the salvage operation of the *Oklahoma* began. The first step was to cut access holes into the fuel tanks so that the fuel could be offloaded onto an awaiting barge. The offloading of the fuel and oil needed to be accomplished to lighten the weight of the *Oklahoma*, which had an estimated dead weight of 27,200 tons. After the fuel had been offloaded, questions remained about what would happen when the *Oklahoma* was righted. Questions ranged from, would the bow and stern turn equally, to, would she sink further into the mud as she was rolled back over? To answer some of these questions divers from Pacific Bridge Company were sent down to obtain soil samples from the bottom of Pearl Harbor before the righting operation was commenced. Once the results of the soil test were reported back to the salvagers the next problem arose.

This was how to assist the *Oklahoma* as she was righted. To begin with, the use of submarine salvage pontoons was thought to be the answer. However, the request for the shipment of five pontoons from the west coast was denied by the Navy. So the problem was solved by creating an air bubble within the interior of the ship. This was accomplished by closing off hatches at the air bubble boundary and opening up hatches on the interior of the ship.[xv] Along with closing off the outlying hatches, the fireroom uptakes had to be sealed off. This was left up to the Navy salvage divers, which was no easy task. These fireroom uptakes measured 30 feet by 30 feet and had to be sealed off to prevent the air bubble from leaving the ship. This was done by building the forms that concrete was to be poured into outside the ship and then disassembled to be transported into the fireroom. Once inside they were reassembled according to exact instructions. The operation of moving the forms into place was hazardous due the toxic gas, hydrogen sulfide, that had accumulated inside the ship from decomposing bodies and the rotting metal from sea water. Once the forms were put into place and wired to the uptake openings, underwater cement was sent down in a pressurized hose to fill the forms and seal up the intakes.[xvi] Once the firerooms had been sealed off, air was pumped into the ship to evacuate the water and raise the air pressure in the man-made bubble to twelve psi. The air bubble that had been created by the divers helped account for 20,000 tons of the *Oklahoma*'s weight, which would greatly help in the righting operation.[xvii] While the operations of creating the air bubble aboard the *Oklahoma* were taking place, engineers from the Pacific Bridge Company began to remove several enlisted men's quarters on Ford Island to make way for the concrete deadmen that would be put in place to anchor down the 21 winches and the righting tackles that were to be used. Once the winches and tackle assemblies were in place on Ford Island, preparation was needed on the *Oklahoma* herself. Therefore connections for the wires that were to be used in righting her were tack welded to her hull. Then, one inch wire was run out from the winches to the tackle assemblies. From the outer tackle assembly, a three inch wire was stretched to the headframes that had been attached to the hull of the *Oklahoma*. From these headframes, the wire was divided into four cattails and these cattails were then attached to the connections that were welded to the *Oklahoma*'s hull. Once all the hardware was in place and properly connected to the *Oklahoma*'s hull the righting operation could commence. At 0841 on March 8, 1943, eight months after preparations had been started, the winches were turned on and the *Oklahoma* began her journey to be turned right side up again.[xviii] With the winches turning the *Oklahoma* rolled at an astonishing speed of three feet per day, and finally came to rest with a list of two degrees on June 6. It had taken 3 months of on and off pulling to roll the *Oklahoma* from 150 degrees to two degrees of port list. Now that the righting was complete it was time to get her afloat and drag her in to dry dock for further repairs.

After the *Oklahoma* was righted, salvagers from the Navy and the Pacific Bridge Company began to inspect the damage that she had sustained during the attack. It was found that the *Oklahoma* was severely damaged on her port side with one of the 48-foot armored plates completely blown off, while other sections of the armor plating had four to five inch cracks in them from the torpedo explosions. Also, the damage on the port side extended all the way up to the upper deck, where the main deck was completely missing altogether along the amidships section. The Pacific Bridge Company came out to the *Oklahoma* and took

measurements of her port side so cofferdams could be fabricated to patch the damaged port side. Each section of the cofferdam was enormous, measuring 13 feet wide, 50 feet high, and weighing nearly 20 tons apiece.[xix] Once the cofferdams were attached to the port side of the *Oklahoma*, pontoons were chained to the outside of the cofferdams to help support the weight, and keep the *Oklahoma* from rolling back over. To finish the sealing the port side, over 1000 tons of marine concrete was poured into the cofferdam to finish the sealing job. Now that the major part of the *Oklahoma* had been sealed off, deepwater pumps were brought in to evacuate the remaining water inside of the ship. The *Oklahoma* was then raised from a 45-foot draft that she was sitting at to a 36-foot draft that was needed in order to enter the dry dock. As the pumps evacuated the water, a problem that was not foreseen surfaced. As the *Oklahoma* was rolled over, part of her hull had gotten crushed and popped rivets out along the bottom. This problem had to be solved and the leaks plugged if the *Oklahoma* was ever going to be refloated again. So divers from the Navy salvage team came up with an ingenious idea of floating kapok (material used in lifejackets) along the bottom part of the hull. This allowed the pumps to suck it up into the hull thus sealing off any leaks that had developed.[xx] Once the problem of the leaking hull was solved, the water pumps continued to work until each compartment of the *Oklahoma* was left with less than two feet of water in them. On December 28, 1943, 751 days after the attack on Pearl Harbor, the *Oklahoma* made her arduous journey to Dry Dock #4, where she would sit in repair. The fate of the *Oklahoma* became clear in dry dock as Navy Yard employees made temporary repairs to ensure her water tightness. They also removed her guns, auxiliary machinery, and all of her ammunition.[xxi] Once the Navy was satisfied that the *Oklahoma* would not sink again, she was moved to West Loch where she would await the highest bidder for scrap metal. On September 1, 1946, the *Oklahoma* was officially decommissioned and sat at West Loch for almost two more years before she was purchased by Moore Dry Dock Company for a total of $46,000. So the beloved *Oklahoma*, with all she had been through and the men that had given their lives in service to her watched on May 10, 1947, as she was towed out of Pearl Harbor on her final voyage to the west coast. But the *Oklahoma*, in all her glory, would not go quietly into the night.[xxii]

On May 17, 1947, for no explained reason, for the skies were clear and the seas were calm, the *Oklahoma* took a port list, the same list she had at Pearl Harbor when she was attacked. The tug crew that was towing her fought four days to try to save her. However, on the fifth night, when the sky was clear, the *Oklahoma* unaccountably straightened upright, held herself high for a few moments then sank straight down, 500 miles off the Hawaiian Islands.[xxiii]

The USS *Oklahoma* was one of the most heartbreaking stories of the Pearl Harbor attack. The blood, sweat, and tears that were given by the Pearl Harbor Naval Shipyard and all the men that worked to rescue trapped sailors and salvage the *Oklahoma* will never be forgotten. These salvagers risked their lives and forged a new page in history with the raising of the sunken *Oklahoma*. Their efforts will always be appreciated. Even though the *Oklahoma* was sold as scrap metal great effort was given to attempt to save her and restore her place back in the Pacific Fleet. A quote from *Trapped in the Oklahoma* best sums up the fate of the USS *Oklahoma:*

Good for you *Oklahoma*! Go down at sea, in deep water, as you should, under the stars. No razorblades for you. They can make 'em from the Japanese ships and planes that did you in. So long *Oklahoma*! You were a good ship.[xxiv]

Notes

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SHARING THE SHIPYARD: WOMEN AT WORK

By Christina Perez

After the onset of World War II, it became apparent that the role of women would have to change from traditional workers to wartime workers. As was customary, pre-World War II, a woman's place was thought to be in the home. The average woman was responsible for cooking, cleaning, and raising the children while the husband was at work. From the once sheltered home life of women, to the full time war relief worker, U.S. women have been behind the scenes in both the world wars. Documented as early as World War I, women were taking active roles in military efforts as well as industrial efforts.

World War II saw the most changes to women in the work force, with six million women who joined the workforce in an arena known then as a "Man's world." Roughly, one-quarter of American women participated in one way or another with the war effort. "The percentage of American women who worked outside the home, at paying work, increased from 25% to 36%. More married women, more mothers, and more minority women found jobs than had before the war."[i] "The American shipbuilding industry, where women had been excluded from almost all jobs except a few office jobs before the war, women's presence went to over 9% of the workforce during the war."[ii] Though few women actually wore the uniform of an enlisted soldier, the work of women during both wars was nonetheless critical to the U.S. Military.

Women of the Pearl Harbor Naval Shipyard:
We'll forge a chain of ships;
Our soldiers sons.
They shall not fail for lack
Of food…or guns!
Not all can shoulder arms,
Nor wing the skies;
There first must be grey ships,
Keen builders' eyes.[iii]

To better delineate how pivotal women were, we can reflect on their efforts after the day of infamy, known as the bombing of Pearl Harbor on December 7, 1941. In the native Hawaiian language, women are called "wahines," but the United State Navy called them "War Workers."[iv]

"Shipbuilding, in contrast to aircraft manufacture, was an ancient craft. Long accustomed to an all-male work force, shipyards were slow to take on women, despite governmental encouragement to do so. The tremendous expansion necessary to replace ships sunk at Pearl Harbor and later Pacific disasters, however, soon made the need obvious. Overall numbers in shipbuilding jumped a phenomenal 15 times–from 100,000 in 1940 to 1,500,000 in early 1943. Some of that million-and-a-half simply had to be women."[v]

With the need high and a state of war proclaimed, America succumbed to their most valuable resource: women workers. In 1943, over 150,000 women would be called to work in shipyards around the United States. Manpower shortages made it necessary to offset the loss of men to the war by adding women in the work force. "Dungarees will replace afternoon dresses and vacuum cleaners will give way to shipyard paint brushes and welding devices in the hands of many more thousands of women in 1943."[vi] The women workers during the WWII era, at the Pearl Harbor Naval Shipyard show a glimpse of their use. According to the Naval Shipyard Newspaper in April 1943, "It may be a man's world, but a few acres of it, the Pearl Harbor Navy Yard, under command of Rear Admiral William R. Furlong, USN, are fast becoming a woman's."[vii] Although women never served aboard any Pearl Harbor naval vessels during this time, their contributions were still, a vital part of the war effort. Hundreds of women donned the outfits of shipyard workers to not only answer the call for the rebuilding of Pearl Harbor Naval capabilities, but also to aid with the now global war effort. Shop by shop, the industrial department at the Shipyard utilized women for work. Newspapers, island wide, were full of want ads requesting women workers for all areas of work. The following examples are the types of jobs in which women were requested, specifically at the Pearl Harbor Naval Shipyard:

Shipfitter's Shop: Women mechanics are being trained in spot welding, hand riveting, assembling and building furniture. Women had made all badges and emblems for the Navy Yard police. At the present time, 85 percent of all the workers in this shop are women.

Central Tool Room: Women issue tools. Two "mechanics learners" are on power saws; one is on a drill press. An additional number of women over 25 years of age, the ship reports could be used for these responsible services.

Need More:

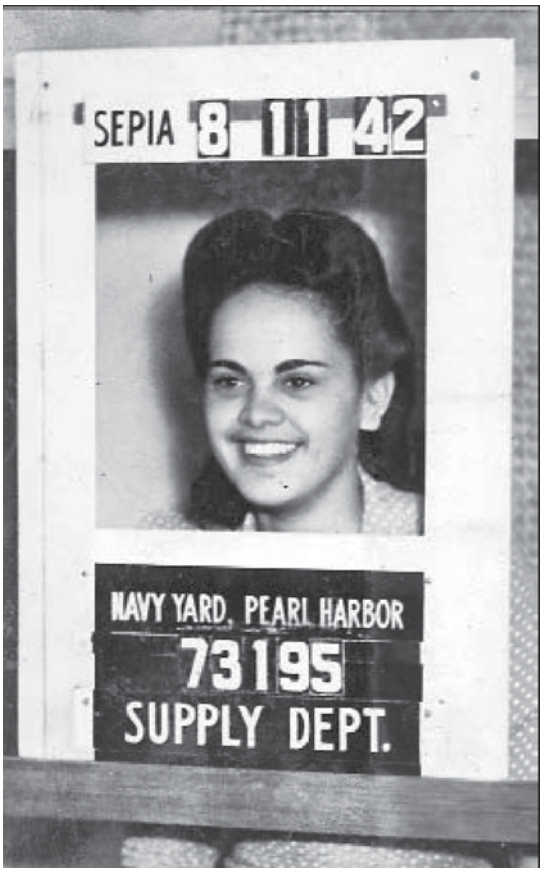
Sheetmetal Ship: Apprentices are employed here, and more women between the ages of 25 and 35 could be used.

Machine Ship: Women operate belt machines, drill presses and lathes. Most of these are mechanic learners, some are machine operators. Here, also, many more could be employed.

Electric Shop: There are two mechanic learners and two classified laborers doing instrument work. Although the shop at present is not equipped for the employment of women on a large scale, upon the installation of new facilities the electric shop will be able to employ up to 100 women.[viii]

As the war propaganda filled the news media, women applied in masses for the Pearl Harbor Shipyard jobs that men had left behind. "By and large women accept shipyard labor because they believe it is their patriotic duty to do what they can to help supply a war need of the first importance, ships."[ix] An analysis conducted by the *Pearl Harbor Banner* in 1943 revealed that over 57 percent of the Shipyard women were married with husbands who were in the armed forces, 27 percent left the clean, quiet world of clerical jobs and another 17 percent were former housewives turned shipyard worker.[x] They could be found in many shipyard trades and occupations. Working hand in hand with the remaining male workers, you could find women in areas such as electronics, radio, machine operators, toolroom mechanics, crane operators, electricians, among the many other shipyard tasks.[xi] The American War Manpower Campaign urged women to work with slogans such as "If you've used an electric mixer in your kitchen, you can learn to run a drill press."[xii]

In conjunction with a woman's demands in labor, war rationing and shortage of domestic resources fell more heavily upon their shoulders as they were all that was left to acclimatize with the war-induced way of life. Aside from dealing with rationing, island wide black outs, shortages of previously abundant supplies, and taking up shipyard work, these same women still had to maintain their households as before. Such sacrifices were urged upon women by organized propaganda campaigns that promoted the practice of frugality, to carry groceries instead of using the car to preserve tire rubber for the war effort, to grow more of their family's food (in "Victory Gardens" for example), to sew and repair clothing (as opposed to buying new clothes), to aid in the promotion and purchase of war bonds, contribute to war bonds, and generally to boost to the morale of the war effort through sacrifice.



Lady shipyard worker. Official U.S. Navy Photo

During the latter half of the World War II years, women were employed more in the direct line of military service. The Navy WAVES (Women Accepted for Volunteer Emergency Service); a U.S. Naval Reserve unit, had over 86,000 members enrolled by 1945. Mass media efforts were put forth to recruit as many women to the reserves as possible. These women were utilized in all lines of work, taking the place of many of their male counterparts. Over 3,000 WAVES arrived four years after the Japanese attack at Pearl Harbor to fill billets the deployed sailors had left open. "Of this total 1,343 are quartered in the WAVE barracks at Pearl Harbor for duty principally in the Navy Yard and the Naval Supply Depot."[xiii] The director for the Pearl Harbor branch of WAVES was Captain Mildred McAfee of the Women's Reserves. Capt McAfee praised the great service of the WAVES in her *Pearl Harbor Banner* interview in June of 1945.

Back in 1942, bringing women into the armed services was considered a perilous experiment. That this is no longer true is due to the decision of the men in the Navy to accept women as equal partners in the work at hand. This

decision made it possible for the Women's reserve to be a part of the Navy Reserve.[xiv]

The WAVES role was of the utmost importance to the War effort in many respects. They wore the ranks of a Navy Sailor and were uprooted from homes all over the U.S. to serve at the Pearl Harbor Shipyard. The WAVES "have been appointed to fill several important and strategic vacancies," according to the Pearl Harbor Banner.[xv] Of these vacancies the WAVES served in billets as Yeoman, working in over 14 different Shipyard offices such as the Planning Division, Supplies Office and Stenography.

Even after World War II, the Pearl Harbor Naval Ship Yard still found its departments utilizing women workers. "Approximately seven percent of the total employees at the Shipyard are of the fairer sex. Most of them will be found behind a desk or a typewriter, or filing letters, memoranda, reports, etc. But there are many who believe themselves capable of doing a man's job; and they are proving it daily."[xvi] Upon the conclusion of World War II, many men returned and expected the women to peacefully go back to their homes. For the first time in the public eye, women dominated the United States workers image. It became apparent that women could do a man's work and could do it just as well. What most failed to realize was that the women were of great need in World War II and their impact was on a grander scale than originally perceived. With their newfound autonomy, the women decided they were in the work force to stay. The women had now placed themselves on equal footing, right next to the men.

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THE ECONOMIC IMPACT OF PEARL HARBOR NAVAL SHIPYARD

By Stanley Tochiki

The advent of ships being able to navigate the globe bought the world closer together. The advances in technology improved from sailing to steam powered ships. Although this dramatically improved maritime activities, it required additional facilities to maintain and refuel the ships.

As the United States continued to grow its Navy became increasingly important. As activities continued to expand into the Pacific there would be a growing need for a repair and re-coaling station. A tiny island in the middle of the Pacific Ocean would turn out to be a prime location to operate this station. This was the beginning of the Pearl Harbor Naval Shipyard that we know today.

In the late 1800's, the United States was looking at building a repair and coaling station in Hawaii at Pearl Harbor. In order to accomplish this, the Treaty of Reciprocity was implemented in 1875 and supplemented in 1887. These treaties allowed the United States to have exclusive access to Pearl Harbor and to build a coaling and repair station. In return, Hawaii was allowed to import sugar duty free into the United States.[i] This arrangement of course benefited the United States by gaining access to Pearl Harbor. There was also a significant gain for Hawaii's economy.

Throughout the Civil War, Hawaii's sugar industry would continue to increase.[ii] However, after the war, tariffs imposed on sugar ended the industry boom. These tariffs would range between 20 to 42 percent and severely cut into the profits of sugar producers.[iii] The Treaty, however, led to an increase of sugar exports soon after it was signed. In 1876, when the treaty was signed, sugar exports for Hawaii were at 21 million pounds. It would continue to rise and in 1890 would reach a total of over 224 million pounds of exported sugar increasing Hawaiian exports to over $13 million.[iv] These revenues from export were not the end of the gains of the treaty as an entire industry was reborn.

Due to the labor intensive nature, the demand for plantation workers also saw a dramatic increase. Thousands of jobs were created in order to meet the supply demands. Prior to the treaty there were less than 4,000 plantation workers. This number grew consistently and would be over 20,000 workers in the 1890s. It was this potential for profit as well as influences from the Spanish-American War which led to the annexation of Hawaii in July, 1898.[v]

With the initial groundwork laid out and a site chosen to build the Shipyard, money needed to be allocated to begin the endeavor. The Act of 13 May 1908, provided funds which allowed access to the harbor, and the building of a Navy Yard, and a dry dock. This is the officially recognized "birthday" of the Pearl Harbor Naval Shipyard. The Act allocated nearly $3 million to develop the Navy Yard and Dry Dock. [vi]

Construction on the Navy Yard began. Its first dry dock would be completed and dedicated on August 21, 1919, racking up a bill of $20 million.[vii] With the Navy Yard and Dry Dock completed, the Naval Station could move to Pearl Harbor and work could begin on the fleet of ships. This is where we can see a huge impact with Hawaii's economy by providing jobs to both military and civilian workers in Hawaii.

During the inter-war years the Navy Yard maintained an average of 1100 employees on its payroll every year.[viii] The Shipyard offered the people of Hawaii stable employment with a reputable organization. It also kept skilled jobs in Hawaii so people did not have to relocate to the mainland. Not only did the Yard provide jobs for skilled labor, it also offered opportunities for the younger, less skilled crowd hoping to get accepted through the renowned apprenticeship program.

The apprentice program had a great impact on Hawaii's job market. Hawaii is an agricultural state, so the Navy Yard developed a program which would train new industrial employees while on the job. This program began in 1920, and has proven to be a successful asset for the Shipyard.[ix] In 1940, the apprentice program received an overhaul in the curriculum and qualifications required. This proved how competitive the program was and how beneficial it could be to the community. Today the apprentice program continues to be a success with hundreds of graduates each year completing the program and attaining journeyman status.

There was also a benefit to working at the Shipyard during the inter-war years. During the early 1930's, Hawaii's economy did not fare too well. The agricultural industry fell into the Great Depression. While the rest of Hawaii feared unemployment, Shipyard employees fared better with minimal decreases in employment due to close ties with the

military. Also, when unemployment peaked at nearly 25 percent in December 1936,[x] employment at the Shipyard was continuing to increase.[xi]

During this period, the Shipyard workers were not the only ones impacted by the Shipyard. Local businesses in Hawaii also benefited by the Shipyard operating in Hawaii. One example would be Hawaiian Dredging Co. When the offer was put out to dredge the channel to Pearl Harbor, Hawaiian Dredging was formed and won their first contract worth over $3 million dollars.[xii]

Hawaiian Dredging would also continue to obtain contracts with the Navy for further work at Pearl Harbor including building Dry Dock #1. Hawaiian Dredging would also evolve into general contracting while continuing to work on improvements with the Shipyard as well as other military contracts.

Today Hawaiian Dredging continues to grow as the state's largest full service construction company. With an impressive list of clients ranging from private companies such as Chevron and United Airlines to government agencies like the Postal Service and the Department of the Army, Hawaiian Dredging leads the way with projects like Ala Moana Shopping Center and Honolulu Airport.[xiii]

As seen above, the Shipyard rejuvenated Hawaii's economy by allowing trade with the United States as well as providing jobs and stimulating businesses. The Shipyard also developed through the inter-war years and survived the Great Depression. However, the potential still has yet to be seen. As the threat of war rose around the world, the United States began to prepare for the grim reality. With the buildup of the Navy in the Pacific, the Navy Yard in Hawaii would have an even greater impact on the economy than we have seen before, and probably ever see again.

Hawaii's economy in the 1940's was quite different from just a few years earlier. The rate of unemployment drastically reduced from the high of 25 percent down to just 0.7 percent in 1943.[xiv] All throughout Hawaii, people were being gainfully employed. The Shipyard also contributed more than their fair share to the economy.

After the United States entered the War, the Shipyard went into full gear. With the numerous naval battles against Japan, the Yard had a tremendous task of maintaining the Pacific fleet and keeping them "Fit to Fight." In order to accomplish these goals, the Shipyard workers were working round the clock to get ships repaired and back out to battle.[xv] Of course with workloads increasing, more workers would also be required, but with unemployment at all time lows, finding employees would be a challenge in itself.

At first the Shipyard would add several hundred workers at a time, but later would recruit by the thousands.[xvi] Starting with nearly 2,500 employees in 1939, that number would more than double to 5,245 in 1940. As war came closer the number again doubled to almost 11,000 in 1941. The next year the number almost doubled again to 20,636 until it reached a peak of 24,910 civilian employees in June of 1943.[xvii] Incredibly, these figures do not include military personnel assigned to the Shipyard which impacted Hawaii's economy as well.

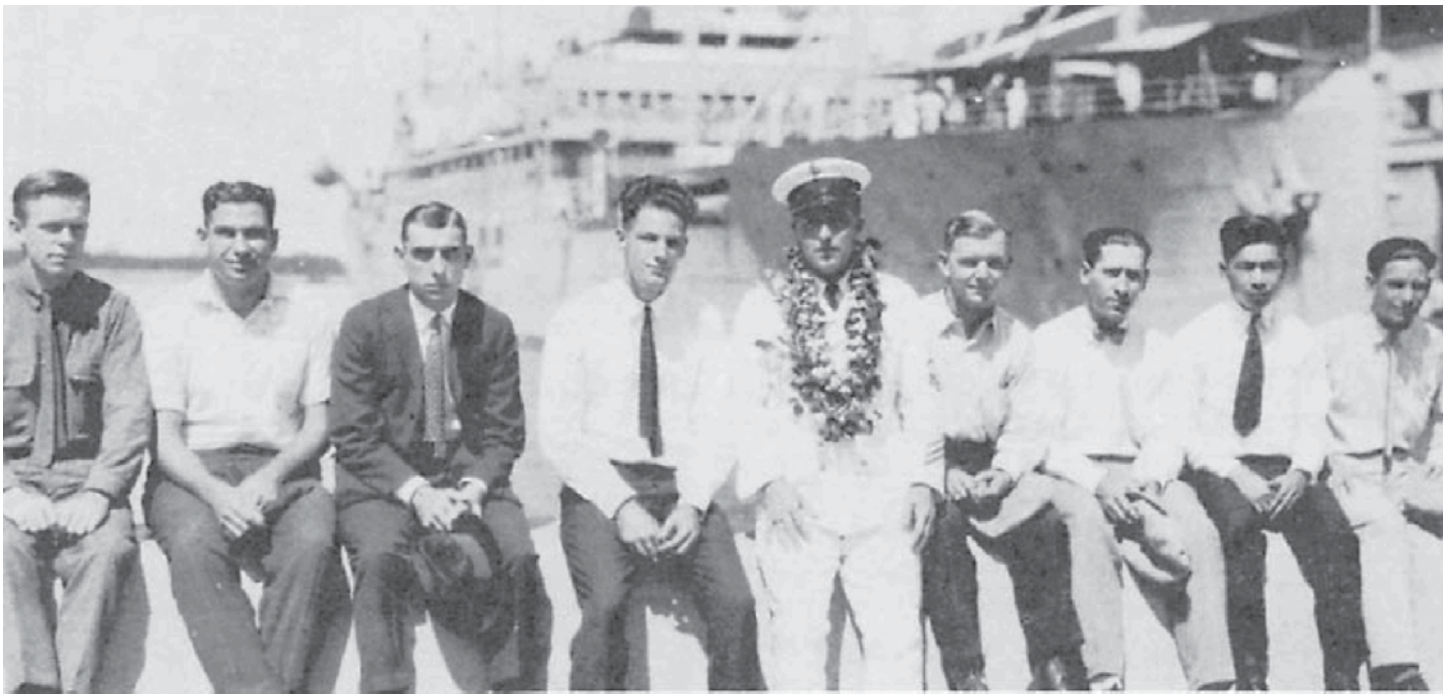
After meeting the needs of the workload, the Shipyard was confronted with another dilemma. Since many of the new workers were from the Mainland, they now needed a place to stay in Hawaii. With over 20,000 employees working at the Shipyard, it became a city within itself. The biggest issues that needed to be dealt with were to house, feed, and transport these new workers and their families.

To accomplish this feat the Shipyard built, well, a city. The official name was Civilian Housing Area 3 or CHA-3 for short. CHA-3 had everything that was needed to sustain the newly acquired workforce. CHA-3 was able to house and feed over 13,000 Shipyard workers.[xviii] The facility also provided other amenities such as a post office, baseball and football fields, stores, and restaurants. Getting thousands of employees to work at once also proved to be a daunting task. The CHA-3 started a mass transportation system known as the "Leaping Tuna"[xix] to ensure that people got to work on time and kept the fleet going.

Overall the period of World War II was a very productive time for the Shipyard and its workers. During the course of the war, its peak of over 24,000 employees made repairs on over 7,000 ships. This made significant contributions to Hawaii's economy by keeping employment and money in Hawaii, and also sustained it when rations and supplies became low. However the saying holds true, all good things must come to an end.

Of course the surrender of Japan brought a huge sigh of relief, but things did not look so great for the employees of the Shipyard. With the end of the war came a reduction of the fleet and in turn a reduction at the Shipyard. Just as when they were being hired, thousands at a time were being released by the Shipyard. In March of 1946, after a previous reduction from over 15,000 to 11,500; it was announced that there would be further cuts to a peacetime level of 4,500.[xx]

After all the cutbacks and reductions at the Shipyard,



Al Reuthing, one of the early graduates of the Shipyard's Apprentice Program, shown upon his retirement on June 5, 1959. Photo from Pearl Harbor Shipyard LOG.

the remaining employees continued to show their resilience and dedication. In Fiscal Year 1946, the employees of the Shipyard earned $42,293,000. It was also estimated that nearly $36 million would stay in Hawaii's economy as either savings or expenditures.[xxi] The Shipyard would continue to be productive by completing from 4 million to over 7 million direct labor hours from the end of World War II through the 70's. The Shipyard would also have slight reminiscence of the past during both the Korean and Vietnam conflicts when there was a slight rise in employment as well as in production output.[xxii] However, as modern times approached, not only a future of cutbacks but the closing of the Shipyard altogether was a possibility.

In the 1990s, there was another fear of cutbacks at the Shipyard. This, however, brought in the question of adapting the mission of the Shipyard. One of the ideas to keep Shipyard employees busy was to include technical jobs not associated with ship repairs, such as building and repairing heat pumps or building the H-3.[xxiii] However, not much happened until the real threat to both the Shipyard and Hawaii's economy came into play.

The Base Realignment and Closure Commission issued a serious threat to Hawaii's economy when it put the Pearl Harbor Naval Shipyard as a possibility for closure. In 2005, there were over 5,000 employees at the Shipyard with total earnings amounting to over $385 million a year.[xxiv] That would just be the initial impact of the closing of the Shipyard. The Shipyard also contracts with 156 companies that total 4,656 more employees. [xxv] The goods and services that are paid out are nearly $558 million, and even just the taxes and insurance totals $134 million going into Hawaii's economy. All in all with the multiplier effect the total impact of the Shipyard on Hawaii's economy is $1.3 billion, or roughly 2.5 percent of the state's $52 billion Gross State Product. [xxvi]

But one should not get too caught up in numbers because that was not going to save the Shipyard. It appears as though logistics and strategy was going to prevent the closure of this Shipyard. Since Pearl Harbor is the home port of about 30 warships and submarines it just makes sense to keep a shipyard open in the Pacific; otherwise ships may have to travel all the way to the East Coast to get repairs. However, the Pearl Harbor Shipyard is not going to take any chances.

In an effort to make use of underutilized dry dock space and get repairs in kind while helping the state's economy and building the private ship repair capacity for surge operations, the Shipyard has agreed to allow civilian cruise ships to utilize the dry docks and perform repairs. In the past, large cargo and cruise ships needed to go to the mainland for repairs because there was not a dry dock big enough to accommodate them other than at Pearl

Harbor.[xxvii] This change of heart from the Shipyard does have an impact on Hawaii's economy.

During January 2000, the Shipyard accepted the SS *Independence* to perform routine maintenance on the hull. Although it took just a little longer than two weeks it had a significant impact on Hawaii. Approximately 700 workers from 26 different businesses were employed for the job. Taking into account the lease of the dock for $140,000 and an extra inter-island trip generating about $1.3 million, the grand total including the multiplier, came out to $5 million.[xxviii] Not bad for two weeks.

Another milestone for the Shipyard was the repairs of the Matsonia cargo ship. In an attempt to expand the public-private partnership, and increase revenues in Hawaii, the Shipyard allowed the Matsonia to have repairs done to the shaft in Dry Dock #4.[xxix] Although it had an immediate impact on Hawaii's economy, it also brings great hope for the future.

The future of the Pearl Harbor Naval Shipyard looks bright. With a focus on efficiency to appease the BRAC commission and an increase in public-private ventures, the Shipyard is here to stay, and that is great news for Hawaii.

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Part II, Spirit:

LIFE AT THE PEARL HARBOR NAVAL SHIPYARD: A HISTORICAL LOOK AT CULTURAL DIVERSITY

By Paul K. Olson

The Pearl Harbor Naval Shipyard has offered much to the betterment of the Hawaiian Islands. For 100 years running, the jobs created and money invested into the Hawaiian economy as a result of the Pearl Harbor Naval Shipyard have been an immeasurable asset to this state and its inhabitants. With the U.S. Military being a significant source of revenue for Hawaii, and Pearl Harbor being the oldest military presence in the state, there is no debate that the Pearl Harbor Naval Shipyard has left and continues to leave an indelible economic footprint on Hawaii.

With that said, other contributions have been made to the state directly attributed to the existence of the Pearl Harbor Naval Shipyard. One of the least talked about contributions is the infusion of different cultures into Hawaiian society as a result of the proactive hiring practices of the Shipyard. Peoples of all races, nationalities, and physical abilities were hired by the Shipyard and performed as a cohesive unit. This is no more evident than in the early 1940s through the early 1950s. In the aftermath of our nation's darkest hour, the Pearl Harbor Naval Shipyard, this culturally diverse nerve center of Hawaii, stepped up to the plate and served the United States of America with utmost courage, honor and distinction. The finest way to honor these individuals is to tell their story on a personal level and to get to know a sample of these people and how they lived their lives and contributed to the success of the Shipyard.

Doroteo Mones of the Philippines was an individual with an extraordinary story of courage. In February of 1948, Montes worked as a janitor at the repair building in the Shop 02 Weight Handling Division. He was an efficient, unassuming handyman whose previous life was quite different than the one he lived at the Shipyard. Prior to arriving in Hawaii in 1946, Doroteo Montes fought as a Filipino guerilla for three years against Japanese forces who occupied his homeland. When Japanese forces invaded his home island of Luzon, Montes was forced to flee after his father was enslaved and his mother killed. Guerilla forces took him in and there he fought for the freedom of his country, drawing recognition and praise from the United Nations. The February 5, 1948, edition of the Shipyard Log notes, "The guerilla life was one of action and excitement. The band made a game of their raids on small Japanese installations, rendering the United Nations a great service with their destruction of supplies and communication lines."[i] Although fighting for a just and noble cause, there were drawbacks to fighting with his fellow guerillas against Japanese forces. Many of his comrades were wounded or killed in action. Even Montes sustained a potentially fatal injury where he was shot in the left thigh and the bullet went all the way through and out the other side of his leg. He was tended to by an American doctor and resumed the quest to win back his country from the Japanese invader force.

Montes came to Hawaii in May of 1946, and began working at the Shipyard in December of the same year. Why did he leave the Philippines? War had taken its toll on Montes and it was time for a change of scenery. The February 5, 1948 Shipyard Log states:

"In all, Doroteo spent three years with the guerillas. After the war, life in the Philippines was not like it had been before. The family scattered and two of the boys came to Hawaii. The elder Montes remained on Luzon where his wife was killed, and two other children went to California."[ii]

Immigrants from Europe made significant impacts in the workplace at the Pearl Harbor Naval Shipyard. One such immigrant was Chris Steenstrup, a young Shipyard toolmaker from Denmark who unknowingly would initiate the General Electric Company's pioneer employee suggestion system. Steenstrup used his ingenuity and formulated a plan to improve punch presses. He presented the idea to his foreman who summarily dismissed the proposition as nonsense. Not only was his innovation rejected, but his foreman also fired him. The April 15, 1948 Shipyard Log elaborates on the incident, "His foreman asked him to mind his own business, told him the company paid experts for this kind of thinking. The bewildered young Dane found himself fired for meddling."[iii] The word of his firing went up the chain, eventually catching the ear of the plant manager. Steenstrup was reinstated and his punch press innovation tested very successfully by accelerating production and cutting costs. The new punching press was approved and according to the April 15, 1948, edition of the Shipyard Log, "Chris was at once given an award, promoted, and put in charge of think-

ing ways and means of tapping the wealth of ideas hidden away in the minds of hundreds of other workers in the plant."[iv] The Shipyard Log also pointed out that as of 1948; $2 million dollars had been paid out to employees for new and innovative ideas which saved General Electric money.

Danny Morena was a very unusual person to be working in the Pearl Harbor Naval Shipyard. As a pool hall employee, it is a safe bet to say that Morena was the only member of the Shipyard who was a direct descendant of a royal bloodline. Further he was the only heir to his father's title as sultan. Morena's father was the Sultan of Lanow on the island of Mindanao, the Philippines. Morena had a very unhappy childhood because of the fact that he was the only heir to his father's throne. He was continuously looked after by his overbearing father, and contact with his mother was forbidden. His father even chewed Morena's food for him until he was twelve years old, a sultan custom of the time to ensure Morena's life. At the age of 14, through the help of his mother, he escaped his father's grasp by fleeing to the United States. For her complicity, Morena's mother was put to death. The October 6, 1943, edition of the Pearl Harbor Banner describes this awful crime:

"Danny's father stormed with rage, threatened death to all implicated but to no avail. Then he tried diplomacy, but despite all his offers of freedom for herself,(she had been kidnapped when but 13) Danny's mother remained obdurate and stubbornly refused to reveal the whereabouts of the royal heir. For this she paid the extreme price, for after his flight, Danny's mother lost her head at the hands of his father. And for this Danny has never forgiven him…"[v]

In 1941, Morena arrived in Hawaii and eventually came to work at the Community Housing Area 3 pool hall at the Pearl Harbor Naval Shipyard where he was a patron favorite. The October 6, 1943, Pearl Harbor Banner interviewed Morena, "(asking Morena) 'How do you like the new job?' was the query put to Danny a couple of days ago, and his answer was, 'I like it swell; I think the boys are going to like me!'"[vi]

There were many common themes which seemed to unite all cultures and the Pearl Harbor Naval Shipyard. One of the most revered and appreciated was church. Church played a vital role in the community as it bonded people together who were away from home, many of whom for the first time in their lives. The Body of Christ Bible Church which congregated at the Quonset Chapel in Civilian Housing III, held a revival meeting on May 5, 1945, to reach out to the "lost souls" of the Shipyard community. Blacks, Whites, Asians, and others all attended this event to hear the preaching of the Word. One of the headline evangelists was Hawaiian Sister Rena Mahoe who captivated her audience with her preaching fervor. The May 13, 1946, Pearl Harbor Banner recounts the details;

"Pastor Flemming introduced the guest evangelist, Rena Mahoe, who got off to a roaring start with a ringing sermon to the congregation on 'The Devil's First Transaction.' Sister Mahoe shouted her sermon all the way through, pausing only a few times to lower her voice to a whisper for emphasis."[vii]

According to newspaper accounts, a giant loudspeaker was installed in the front of the chapel so that the sinners of Pearl Harbor could be saved from their iniquity and brought unto to the Lord. The loudspeaker was not needed though because the singing, preaching, and praying were so loud that a sound system was unnecessary.

Athletics played an enormous role in the lives of many workers of the Shipyard. In 1943, unfortunately, much of the United States was still segregated in several facets of life, to include team sports. The Shipyard was no different in this regard as it had a white team and a colored team. However, on a positive note, at least the segregated teams did play against one another in the Hawaiian Service Football League. In August of 1943, Timothy Evans Jr., an African-American, was named as the new coach of the CHA 3 colored football team. As an offensive guard at Xavier University in New Orleans, Evans was named to the colored All American team in 1939. Prior to being named coach, Evans also played for the CHA 3 colored team and played first base for the Red Sox of the Pearl Harbor Naval Shipyard.

Football was not the only sport where people of different ethnicity and race competed against each other while stationed at the Shipyard. Boxing events were a massive draw at the Shipyard where employees as well as non-shipyard personnel sponsored by the Shipyard fought against each other in front of wildly enthusiastic crowds. One of the most sought after fighters was an African American named Terry Gibson who routinely fought at Pearl Harbor as well as other venues on Oahu. The May 13, 1946, Pearl Harbor Banner, with an interview of Ensign Lloyd W. Gaylord, highlights one such boxing event involving Gibson:

A huge athletic show set for Friday, May 24; bring boxing back to the CHA III Sports Area for the first time since early 1945, it was announced by Ens. Lloyd W. Gaylord, athletic officer. Headlining the show will be Terry Gibson, army welterweight champion. "Gibson as many know, is a very much sought after boxer on the island," stated Ens.

Gaylord, who is supervising the set-up of the show, "and we are very fortunate in securing him for our initial smoker of the reorganized Area athletic club."[viii]

The arts were also a major emphasis of cultural diversity at the Pearl Harbor Shipyard during the 1940s. Whether it was a musician such as Granville P. Andersen, an African American from Brooklyn, or a painting artist such as Robert Holcombe, an African American from Atlanta, people from all walks of life participated in the arts as a leisure time activity and a break from the rigors of a demanding Shipyard work schedule. These artisans made life away from home a little bit more enjoyable and relaxing for all individuals at the Shipyard.

Granville P. Andersen, a refrigerator mechanic from Shop 56, played lovely melodies on his marimba. Back home in New York City, he was an accomplished musician at the New York Stadium of Music and in February of 1944, he took those talents with him to the Pearl Harbor Naval Shipyard. Unfortunately for Andersen, he was unable to ship his marimba with him initially and had to wait until the summer of 1946 to finally ship his instrument to Hawaii. He diligently set out to reacquire the skills needed to play his instrument. The July 31 edition of the Shipyard Log talks about Andersen:

"For the past few months he's been trying desperately to recover the professional technique which his listeners loved before the war. It's been just like learning to play over again; but now Anderson are regaining confidence and the future holds a career in music for the mechanic."[ix]

Robert Holcombe, an employee of the sign-painting room of Shop 07, painted more than just signs. He was also a talented oil painting artist. Originally from Atlanta, Holcombe initially arrived at the Shipyard in 1941, where he was one of the first employees assigned to the art shop in Shop 71. After a stint in the service during WW II on the island of Okinawa, Holcombe returned to the Shipyard and was assigned to the sign-painting shop. He painted numerous island scenes which were hot items for Shipyard personnel. Two of his favorite oils were Dark Mountain and Windward Molokai.

Social organizations played a central role in the cultural diversification of the Shipyard. Organizations such as the Interracial Club of Honolulu and simply named Filipino Club helped to organize people with common bonds in order to maintain their cultural roots as well as to promote cross-cultural awareness throughout the Shipyard.

The Interracial Club of Honolulu, a predominantly African American club made up of workers from the Shipyard, was founded in October of 1945. The Pearl Harbor Banner on February 25, 1946, writes:

"The Interracial Club of Honolulu, founded in October 1945, plans an affiliation with the National Association for the Advancement of Colored People…The club plans to promote better race relations through correspondence, committee contracts, and the like."[x]

The Filipino club was founded in February of 1946 on the premise of shipyard cooperation and to raise funds for Philippine post World War II reconstruction. Their club regularly met at the Family Restaurant in Civilian Housing Area III.

An indirect manner in which cultural diversity was promoted during the 1940s for Shipyard personnel was through the Pearl Harbor Banner's *Question of the Week.* This segment of the paper was dedicated to putting the thumb on the pulse of the Shipyard community at large by asking opinions on what is good and what is not so good with the Shipyard and community housing. On January 6, 1946, this best and worst question was asked at the CHA III bowling alley regarding life in general at CHA III. Posted below is a written excerpt of answer given by Tennyson Goode, an African American Shipyard employee from Shop 02 who had been living in CHA 3 for four months. Pearl Harbor Banner, January 14 edition, 1946:

"Baseball on Furlong Field is the best thing this area ever had or ever will have, I say. Of course, bowling here in the bowling hall is good too, but I used to follow baseball quite a bit back in the states and I think the games played out here are tops. The worst feature of the area is the lack of a good variety of fresh vegetables in the mess halls. Sure, we have lettuce and celery…but you get tired of lettuce and celery. We need a change once in a while. Otherwise, I haven't got much to complain about."[xi]

As noted, the *Question of the Week* segment of the Pearl Harbor Banner was an indirect manner of promoting cultural diversity because of the fact that questions posed to the Shipyard populace were not restricted to just individuals of white skin. The fact that the Shipyard newspaper made the effort to be all-inclusive in their reporting showed strong progress in cultural awareness and also vividly illustrated to Shipyard employees that cultural diversity was alive and well in the Shipyard and would continue to grow and prosper.

One area of cultural diversity where the Pearl Harbor Naval Shipyard was way ahead of its time had to do with its hiring of disabled personnel. In 1952, over 100 physically dis-

abled employees contributed to the overall continued success of the Shipyard. Blind personnel, deaf personnel, amputees, and wounded veterans all effectively contributed to the mission success of the Pearl Harbor Naval Shipyard. The Pearl Harbor Shipyard Log, September 5, 1952, proclaims:

"The valuable skills of over 100 physically handicapped persons are being used at the Pearl Harbor Naval Shipyard in a variety of trades and occupations…The physical handicaps under which these employees work range from amputations of limbs and fingers to heart trouble and high blood pressure. Many are blind in one eye, have defective hearing, and many, because of old injuries, are restricted to lighter types of work. Some of the workers are veterans who have still with them the effects of wounds suffered in fighting for their country."[xii]

The Navy and the Shipyard firmly believed that disabled employees were an invaluable asset to the mission and the Shipyard made sure that these employees were provided a thorough medical evaluation prior to assuming duty to ensure that they were safely capable of performing that duty. The same article noted above states:

"Physically handicapped workers are an asset to any industrial organization when properly placed. At the Shipyard, complete and thorough medical examinations guarantee that the work being performed by the handicapped person is work he can do well, without danger of aggravating his condition."[xiii]

Handicapped individuals were afforded the same rights to a quality job as all physically capable employees and the Shipyard provided the support and backing to accomplish those tasks without fear of reprisal.

Cultural diversity has always been at the forefront of operating policy at the Pearl Harbor Naval Shipyard. All races, ethnic groups, religions, gender, and physical abilities have been welcomed with open arms by Shipyard employers and employees alike. Has it always been a smooth road? No. But the Shipyard continually strived to advocate cultural equality and always placed a premium on encouraging cross cultural interaction in order to facilitate mission accomplishment and employee harmony. The Pearl Harbor Naval Shipyard will continue to push the envelope of cultural diversity as it sails into its second century of existence.

Notes

[i] "Shop 02 Handy Man Is Veteran Of Philippine Guerilla War." *Shipyard Log*, 5 February 1948, 3.
[ii] Ibid.
[iii] "Danish Toolmaker Started Suggestions." *Shipyard Log*, 15 April 1948, 3.
[iv] Ibid.
[v] "Danny Morena, CHA3 Pool Boy, Is Sultan's Son." *Pearl Harbor Banner*, 6 October, 1943, 11.
[vi] Ibid.
[vii] "Dynamic Evangelist At Great Revival Meeting." *Pearl Harbor Banner*, 13 May 1946, 5.
[viii] "Gibson To Box Lino Pacheco In Main Event Of First CHA III Fight Smoker Since Early 1945." *Pearl Harbor Banner*, 13 May 1946, 7.
[ix] "Pleasure In Music? Just Ask Granville Anderson, Reefer Mechanic." *Shipyard Log*, 31 July 1947, 2.
[x] "Interracial Club: Professional Gambling Overlooked in BQ 43, Says Interracial Head." *Pearl Harbor Banner*, 25 February 1946, 3.
[xi] "Question Of The Week." *Pearl Harbor Banner*, 14 January 1946, 4.
[xii] "Over One Hundred Handicapped Workers Employed Here." *Pearl Harbor Shipyard Log*, 5 September 1952, 1.
[xiii] Ibid.

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HEROES AND HEROINES OF THE PEARL HARBOR NAVAL SHIPYARD

By Amy Lynn Arabian

According to Webster's Dictionary a hero is, "In mythology and legend, a man celebrated for his bold exploits," or "A person noted for feats of courage or nobility of purpose." Throughout its 100 years, Pearl Harbor Naval Shipyard boasts many heroes and heroines. I have gathered some of the most heroic and compelling stories of those who displayed unparalleled courage, strength, and will to make a difference in the lives of others. A current Shipyard employee, Melissa Lamerson, would describe a day at work as, "just another day to get to know your fellow tradesmen and women, and become more a part of the Shipyard family."[i] "Everyone is so passionate about what they do, you can't help but feel the overwhelming sense of camaraderie,"[ii] explains Caroline Brewster. The men and women I chose to write about have the most influential and riveting stories of all the men and women that were named heroes in the history of Pearl Harbor Naval Shipyard. My military training has taught me that one of the most important core values should be, Selfless Service, which the following men and women have displayed.

George S.B. Walters was described by most as a kind and honest man. He was a civilian employee and a member of Shop 02, an engineman and a traveling crane operator by trade. During the Japanese attack on Pearl Harbor on December 7, 1941, Walters was operating his crane at Dry Dock #1, when the first wave of attacks struck Battleship Row coming from the east side of the island. In an attempt to try to deflect the fire from the enemy planes, Walters used his crane, and moved it back and forth on the track trying to protect his "family" of Dry Dock # 1 along with the three vessels she held: USS *Pennsylvania* and the destroyers *Cassin* and *Downes*. His number one priority was making sure everyone was safe, and protecting what everyone had worked so hard to build and maintain. Before the workers at the dry dock had knowledge of the attack they thought Walters was playing a practical joke by getting in the way; they were not yet aware they were being attacked by an enormous aerial formation of Japanese aircraft. Mr. Walters was simply trying to shield them from the fire of the attack. When a 500 pound bomb exploded near his crane, the impact made a 17-foot crater. If he had not moved his crane the last time, he would have taken a direct hit from this massive explosive devise. The force of the explosion violently tossed Walters about the cabin of his crane, and he quickly became disoriented. A Navy Officer ran up to the staggering Walters and grabbed him before he fell to the ground. He was brought to the dispensary where he learned what had happened. While reflecting on the day's events, Walters wondered how he had survived that day. "Why has God protected me, I don't know," He said. "But he must have had a reason."[iii] His concern was not for himself, it was for the safety of others at the dry dock during the attack. Walters was cited for many attempts to retaliate on the Japanese that day; he aided Navy gunners in the fire fight, he used his boom as a pointer to warn the gunners where the Japanese aircraft were, he contributed to the destruction of eight out of 10 enemy planes[iv] and he was also able to shield the men in the area from the enemy fire. George Walters exemplified courage on that day, and for his selfless service there was a blue collar Shipyard award named for him. The George S.B. Walters Shipyard Service Award is given to a blue collar Shipyard worker every year since its start by the Honolulu Council of the Navy League of the United States in 2006.

Also named heroes of the Pearl Harbor Naval Shipyard during the attacks on December 7, 1941, were 20 men from Shop 11. They led the rescue and salvage operations on the USS *Oklahoma*. They saved 32 of the 429 officers, Sailors, and Marines assigned to her decks. Of the 20 men that performed the arduous tasks of rescuing the men, and that faced painfully long hours in the attempt to save as many men as possible, were Joseph Bulgo Jr. and Julio DeCastro.[v]

Joseph Bulgo Jr. was a caulker and chipper from Shop 11. Bulgo initiated the rescue efforts with Shop 11. During the rescue his famous words to the trapped men were, "Climb on my back, I will get you out."[vi] Just as the others from Shop 11, Bulgo initiated the rescue just one hour into the attack and worked around the clock, doing whatever they had to do to rescue as many men as possible. After Bulgo passed away, a famous screenwriter, Mayo Simon, studied Bulgo's life in depth and it was rumored that Simon was working on a script to make a movie; however, it never made it to the big screen. Throughout Simon's research, he uncovered the truth about the citation Bulgo earned from

the Navy for his efforts during and after the Japanese attacks. It was stolen from his possession, and when the civilian worker contacted the government to retain a copy, Bulgo received no response.

One of the leading men of Shop 11 was Julio DeCastro. He was responsible for the quick reaction to the attacks. The rescue efforts started just one hour into the attack. He and his men worked under enormous pressure of being fired upon by the Japanese planes while they were trying to cut through the steel hull of the USS *Oklahoma* with a pneumatic chipping torch in efforts to save trapped men, this proved to be their most daunting task. His decision to change from a regular torch to a pneumatic chipping torch proved to save lives of the men that were trapped beneath her hull. The traditional torch the Shop 11 men were using created toxic fumes and gas that could have suffocated some of the men that were trapped inside. Julio DeCastro's major contribution was his responses were quick, his orders were firm, and his plans were well thought out and this made a large difference in the outcome of the rescue effort. They continued to work frantically to save as many men as possible. DeCastro worked and managed the effort very well, he ensured all his men were operating safely, and ensured they were not putting themselves in danger. "The *Arizona* was still burning—-it threw an eerie light on us as we worked. And for about an hour there was anti-aircraft firing all over the place. But we kept working…"[vii]

The next two Shipyard workers to pay homage to are George Nakamoto and Edward Kahai. They both were Hawaii natives that were civilian employees at the Shipyard; and they received accolades for heroism during the Pearl Harbor attacks just as the previous heroes. George Nakamoto was a rigger and boat operator. During the Japanese attacks he was in the harbor operating his tug boat *Balba*, which he used to tow the mine layer *Oglala* away from the cruiser *Helena* in hopes that the Japanese would have a hard time targeting them. Nakamoto drove Balba up and down the harbor trying to locate and rescue any men that were still alive from the oil drenched, burning waters of Pearl Harbor. Nakamoto explained that day as horrifying, he remembers the distinct smell of oil, fire burning wood and human flesh. "The sights, sounds, and smells of that day will be forever in my mind," explained Nakamoto.

Another selfless hero was Edward Kahai. Kahai was a quarter man and electrician at the Shipyard, a real distinguished employee among his shop. He was one of the civilian workers that responded immediately to the attacks of the Japanese planes. Kahai was getting off of work from the night shift when the first wave of attacks came through. At first he too thought it was just a drill, but soon realized when he felt and heard the impact of the first bomb, that this was no drill. He made sure everyone he was with was safe. Then he proceeded to Dry Dock #1 where there were downed power lines that needed his electrician expertise and fires everywhere. Kahai rushed to help secure downed power lines at Dry Dock #1, and then proceeded to 1010 dock to help put out fires that were taking over the area. Kahai worked nonstop day and night for the next few days before the Shipyard workers, sailors, and marines were able to get the mayhem of the attacks under control. Kahai, unlike many of the other rescuers, did not have an assigned job. He worked wherever he was needed. Kahai and the entire staff at the Naval Shipyard will never forget the bonds that were formed by the exemplary teamwork they displayed. [viii]

Another survivor, Claude Ortiz, was a civilian worker assigned to repair work on the USS *Shaw*. Ortiz was a 79-year-old Navy Shipyard worker as of 2001, who, until then, did not speak of the horrors of Pearl Harbor. "Maybe the memories are so bad, my mind shut it out,"[ix] explained Mr. Ortiz of his decision to only speak to his family on the subject of that harrowing day. Ortiz and his crew members were instructed to make repairs on the *Shaw* because it was going to be out to sea in a few days. They finished their repairs and stopped work for the evening for the annual workers *lu'au.* Their boss reminded them that they must report to work the following day. Sunday morning the men were tasked to work on final repairs and prepare her for sea the following day. Ortiz was chatting with the ship's deck officer when he spotted the first Japanese plane descend on Pearl Harbor. Ortiz said, "That looks like Japanese planes," the officer responded, "those are just maneuvers."[x] Then all of a sudden bombs started flying. Ortiz watched from a distance as the USS *Arizona* blew up, killing 1,177 men. Then he witnessed the USS *Oklahoma* capsize, trapping a majority of its crew members. Then at 0900 the USS *Shaw* took three direct hits which caused an enormous explosion from the ignition of the forward magazine. The vessel was split in two, breaking off at the bow of the ship. Ortiz was at the rear of the ship when the explosion occurred and was able to escape from the dry dock and take cover. If Ortiz was not behind the Ship's superstructure he would not have made it out alive. He took cover and called out for a friend he was working with. Right in front of him a puff of smoke and

debris went flying and he saw his friend collapse. The man was in tears, trying to call out for Ortiz's help. He ran to his friend. He found him lying on the ground and discovered his legs were shot off from Japanese fire. "They were shot to Hell,"[xi] he said. He stayed with his friend until help arrived. Ortiz recalled they took him to the old Tripler Hospital. The night hours were passing by, and by dusk Mr. Ortiz and six men were sent to aid the rescuers at the *Oklahoma*. They went to the *Oklahoma* site with a pneumatic drill in hand in preparation to rescue more men. The hole created was only 18" in diameter and all the men trapped were all trying to escape at once. Ortiz describes this as "a very sad moment."[xii] The men slept overnight to wake up to a very horrific assignment. They were ordered to gather bodies from the oil saturated waters of the harbor, to place them in a mass grave at Red Hill until the Punchbowl cemetery was opened. The Shipyard workers were not allowed to leave their shops for 14 days after the attacks. Ortiz later volunteered for the Navy and served until the end of the war. After the war, Ortiz spoke about how he never talked to anyone about the horrors of that day to anyone except his family members. Sixty years later he explained: "Maybe I need to tell the stories now because a lot of my co-workers are gone. They were the heroes. They risked their lives to save others."[xiii]

Another hero among all that contributed to the rescue efforts during December 7, 1941, was Commander Edward C. Raymer. Cmdr. Raymer was a Navy Diver assigned to the rescue and salvage operations at Pearl Harbor Naval Shipyard after the attacks. Raymer recalls the feelings he felt when he learned of the attack on Pearl Harbor. He felt angry followed by a rush of excitement. He knew that he and his team of divers would be mobilized to Pearl Harbor to aid in operations. Cmdr. Raymer's memoir, *Descent Into Darkness* is the sickening truth of what Navy divers had to deal with and the dangers they had to put themselves in to save others. Raymer explains in detail what it is like to muster the courage to dive to depths of pitch black and work in the tombs of the men who did not survive. He says, "The dives get more and more dangerous; the use of fragile and outdated equipment, the twisted metal and exposed beams of the wreckage, the human bodies, and the sediment from the ship settling made the working conditions miserable."[xiv] The deplorable conditions these men had to effectively work in began to take a toll on their bodies and minds. Cmdr. Raymer explains what the men did, given the once in a lifetime opportunity of a liberty, to boost their morale. They made 190 proof moonshine alcohol in attempts to attract the beautiful *wahine* of Hawaii. They used their liberties for different things; some needed companionship of a woman, while others would settle down to a 24 ounce steak at Ernie's Bar and Grill in downtown Honolulu. The men of the diving team were very courageous and heroic. Cmdr. Raymer was very humble in writing his memoir; he wrote the tale of how he remembered the events.

The next section credits the first group of heroines to be named during the Dec. 7, 1941, attacks, the members of the Navy Nurse Corps. Along with the men that worked at the Naval Shipyard there was also another group of people that made many large sacrifices to render services to others. In 1908, when the Pearl Harbor Naval Shipyard was established, so was the Navy Nurse Corps. The Nurse corps employed 20 females that made a very large contribution to their country by serving with the armed services. By this time there were 30 nurses in the corps. One of the original Navy Nurses, Lieutenant Ruth Erickson, NC, USN, recalls her travels to Pearl Harbor. She remembers the maneuvers of the United States Navy Fleet from New York to their home base in the San Pedro, California. Then in the late summer of 1939, the Pacific Fleet would maneuver to Hawaii, off the coast of Maui. When they arrived, she received her final orders to be detached to the Pearl Harbor Naval Hospital. Lt. Erickson says, "Tropical duty was another segment in my life's adventure!"[xv] The nurses that were assigned to Hawaii regarded it as a dream assignment, but a few years of bliss turned into many days of fear, anguish, and utter shock of the events following the attacks.

The women of the Nurse Corps were overwhelmed by the events of December 7, 1941. Lt. Erickson recalls having to rush to the hospital dodging bullets and shrapnel on the way to the dressing room of the hospital. Immediately after the first wave of attacks swept the island the casualties and the wounded started filtering into the nurses who were already working frantically. There were so many men that needed attention they had to develop a system of how they would prioritize the victims by severity of injuries. The nurses and the doctors worked as fast as their bodies would carry them. Many nurses, frightened and sickened by the sights of war, had a hard time witnessing the mass causalities. One nurse recalled the day and commented, "Those boys were the real heroes, and they were so young,"[xvi] said Peggy Dye. The nurses and doctors of Pearl Harbor Naval Shipyard were undoubtedly the most heroic men and women the Navy had to offer of this time. They treated 327

burn cases within the first few hours of the attack. Lt. Erickson remembered their first wounded patient:

"The first patient came into the dressing room at 8:25 a.m. with a large opening in his abdomen and bleeding profusely. I can still see the tremor of Dr. Brunson's hand as he picked up the needle to start an intravenous transfusion. Everyone was terrified. The patient died within the hour."[xvii]

The Navy nurses continued to work around the clock for three days without sleep, then following that for a total of 10 days, the nurses worked with brief periods of rest. Following those 10 days, if and when these ladies would get a break, it was spent in the burn ward of the hospital spending time with the victims of this tragic day. Six veteran nurses recently revisited Pearl Harbor after many years. For some it was their first time back since WWII, others have returned a few times. But the similar response was that they could not believe how much Pearl Harbor has changed. These six individuals were honored and cited for their courageous efforts that day, at the premiere of the motion picture "Pearl Harbor," on May 21 aboard the USS *John C. Stennis* (CVN74). The six individuals were Lenore Rickert, Rosella Asbelle, Peggy Dye, Helen Entrikin, Bertha Roberts, and finally an Army veteran Nurse Sara Entrikin. The distinguished guests were escorted around the island by Capt. Frances Connor, director of nursing at Naval Medical Clinic Pearl Harbor. He explained their efforts on the day, "These nurses worked at a relentless pace, trying to keep up with the constant flow of patients."[xviii]

Previous Shipyard workers were named heroes into and after WWII. Herbert K. Pililaau is a hero who was a former civilian worker at the Naval Shipyard who was born and raised in Waianae, Hawaii. After working in Shop 72 at the Pearl Harbor Naval Shipyard he went on to join the United States Army. Pililaau served in the Korean War after enlisting into C Company, 1st Battalion, 23rd Infantry. While based in Korea, PFC Pililaau led his platoon in securing a major terrain feature, "Heartbreak Ridge." When the unit's ammunition was almost spent they were directed to withdraw to new position, PFC Pililaau volunteered to cover the unit's withdrawal. As the unit withdrew from Heartbreak Ridge, PFC Pililaau fired his automatic weapon at the enemy to ensure the safe getaway of his comrades. PFC Pililaau had thrown all his grenades and exhausted his ammunition and he found himself in hand-to-hand combat with a foe. PFC Pililaau courageously fought with just his trench knife and his bare fists until he was exhausted and mortally wounded. PFC Pililaau lost his life trying to safeguard the lives of the men in his platoon. PFC Pililaau was the first Hawaiian to be awarded a Congressional Medal of Honor posthumously in 1952, for his gallant service during the Korean War. Not only did PFC Pililaau receive many awards for his courageous efforts he also received the honors of having the camp in Seoul, Korea, along with a park in Waianae, Hawaii, and a Navy Vessel named for him.[xix]

Camaraderie stayed alive after WWII at the Pearl Harbor Naval Shipyard. Mrs. Jean Colbert, administration department, and Mrs. Irene McCall, welfare and liaison director of the administration department, spearheaded a major project for a former Shipyard worker with polio in 1946. These two ladies along with a representative from the Honolulu Chapter of The National Foundation for Infantile Paralysis (NFIP) rallied the workers of the Shipyard to contribute their time, materials, and funds to build a lift to aid the polio patient in transportation. This lift was designed and built by workers from all the different shops in the Shipyard. As Colbert explained it, "The workers rallied to build this apparatus with minimal funds to help a fellow family member of the Shipyard."[xx] The patient was about to be released from the NFIP back to his family, which means his family would have to lift him several times a day from his bed to the iron lung. The workers gathered together to help out the victim and to make it easier on his family to care for him by eliminating all manual effort. They designed the lift to hoist the patient in and out of the iron lung. The funds that were made available for this special project were provided by the civilian welfare fund, under the direction of Rear Admiral Louis Dreller, commandant of the Pearl Harbor Naval Shipyard. The following shops were responsible for various parts of the project operation: Shop 56 design and planning, Shop 26 pipe, Shop 51 welding, Shop 74 electric, Shop 72 sail, Shop 71 rigging, Shop 31 painting, and finally Shop 17 machine and sheet metal. "The team work on this project was outstanding, some of the best collaboration I have seen at the Shipyard,"[xxi] said McCall.

Throughout my research I found that the men and women that are employed at the Pearl Harbor Naval Shipyard are by far the "Unsung Heroes and Heroines," of the Navy and the Pacific Fleet. These men and women of the Shipyard have been true to their mission, and have upheld and exceeded the standards of a very busy and active Naval Maintenance and Repair Facility. "Pearl Harbor Naval Shipyard is Hawaii's regional maintenance facility for the Navy, and in that capacity, they keep the Navy ships and submarines 'Fit to Fight'… and win."

Notes

[i] Melissa Lamerson (employee of Pearl Harbor Naval Shipyard), in discussion with the author, February 2008.
[ii] Caroline Brewster (employee of Pearl Harbor Naval Shipyard), in discussion with the author, February 2008.
[iii] "Nominations Open for Outstanding Blue-collar Shipyard Civilian." *Shipyard Log*, October 2007.
[iv] Ibid.
[v] "Pearl Harbor Hero Dies in San Francisco." *The Star Bulletin*, August 20, 1980.
[vi] Ibid.
[vii] "65 Years Later… Remembering USS Oklahoma (BB37)." *Shipyard Log*, October 2006.
[viii] "Shipyard Workers Real Heroes." *Pearl Harbor Banner.* July 20, 1946.
[ix] Ishikawa, Scott. "Survivor revisits Pearl Harbor." *Honolulu Advertiser*. November 23, 2001.
[x] Ibid.
[xi] Ibid.
[xii] 'Ishikawa, Scott. *Survivor revisits Pearl Harbor*." *Honolulu Advertiser*. November 23, 2001.
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[xvii] Lieutenant Ruth Erickson, NC, USN. *Oral Histories of Pearl Harbor Attack: Dec. 7, 1941*.
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[xviii] Ibid
[xix] "Herbert K. Pililaau," *Shipyard Log*, Thursday, May 22, 1952.
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HOLLYWOOD COMES TO PEARL HARBOR NAVAL SHIPYARD

By Kendz Toussaint

On December 7, 1941, the island of Oahu was the victim of a Japanese surprise attack. At 7:31 am, the first Japanese bombs fell in Kaneohe Naval Air Station. Schofield Barracks, Wheeler Army Air Field, Hickam Army Air Field, and Pearl Harbor were also attacked. Pearl Harbor's Navy fleet was the main target. Seven heavily armed battleships were resting at battleship row that morning: USS *Nevada, Arizona, West Virginia, California, Tennessee, Maryland, Oklahoma*. Despite the impressive firepower concentrated in the harbor, American forces found themselves nearly defenseless.[i] Torpedoes and bombs caused massive damage. Of all the ships in Pearl Harbor, it was the *Arizona* which suffered the most from the attack. The Japanese inflicted over 2,400 American deaths, and 21 United States ships were either sunk or crippled and 162 aircraft destroyed.[ii] Pearl Harbor Naval Shipyard, one of the largest ship repair facilities in the United States, was created in May, 1908, by a Congress spending authorization of $3 million dollars. It had played and continues to play a significant role in maintaining the Navy's capabilities. After the Japanese attack, the Shipyard began repairs in order to make the Pacific Fleet operational. For 10 months, salvage work went on at Pearl Harbor Shipyard at a tremendous pace. The first priority was the task of resurrecting America's fallen fleet. Special teams worked day and night. As a result, the USS *California, Nevada,* and *West Virginia* were re-floated and returned to service. The capsized *Oklahoma* was re-floated but unable to be salvaged. In all, 18 of the 21 U.S. naval ships sunk or damaged in Pearl Harbor were returned to action before the end of World War II.[iii] Since the attack, Hollywood has shown particular interest on Pearl Harbor and its shipyard. What is the contribution of the variety of films involving Pearl Harbor? After examining different films on or including Pearl Harbor and their specific aspects, we will expand on the role of the legendary Sharkey Theater and finish with a look at Hollywood movie figures who took part in the December 7 attack and World War II.

Several films depict the attack of Pearl Harbor, including the Japanese planning and execution of the attack and the American experience before, during, and after the attack. However, it is important to discern between two types of film. The distinction relies on the contribution of the film and whether it is pure entertainment or didactic. In other words, is it fiction or educational? The first category of films has an educational aspect. Those films closely respect the historical facts and events as they really happened. Moreover, the account of the story is not wrapped in romance, involving a love story or added action in order to be more pleasant for the audience. "Tora, Tora, Tora" is a perfect example of an educational film about the Japanese attack on Pearl Harbor. This film is considered the most authentic in relation to historic facts. It relates the story of the attack with a balanced perspective since it takes into account both the American and Japanese views. Moreover, contrary to the majority of films on the subject, it does not portray Japan as the villain and shows the rationality to Japanese actions. The plot begins with the Japanese government's negotiation and response to the ultimatum posed by the United States concerning Japan's muscular territorial expansion policy. After choosing to attack, Japanese Admiral Isoroku Yamamoto, who is aware of American strength, meticulously plans to attack Pearl Harbor. His main target was the Shipyard and more particularly American carriers and battleships. The movie accurately shows Japanese preparation and training on recognizing the different target ships of the Shipyard while the Americans, who despite gathering information on the attack, ignore the evidence of an imminent attack and fail to react accordingly and protect the Shipyard.[iv] The movie ends with the successful Japanese air raid. However, Admiral Yamamoto, who knows Americans' strength of character well, mentions at the very end, "I fear all we have done is to awaken a sleeping giant and fill him with a terrible resolve."[v]

The second category of film relating to the attack on Pearl Harbor and its shipyard is more of a fiction or "Hollywood" type. The degree of fiction and accuracy to the actual historical facts varies from one film to another. Here, the storyline does not revolve around the attack itself but focuses more on a story that appeals the audience and makes money. Thus, changes and variation to the true story are made to fit the "big screen." "Pearl Harbor," released in 2001, is a Hollywood movie evoking the attack and stars Ben Affleck, Cuba Gooding Jr., Josh Hartnett and Alec Baldwin. "Pearl Harbor" is a dramatic re-imagining of the Pearl Harbor attack through the love story of Ben Affleck (Rafe McCawley) and Evelyn (Kate Beckinsale). Despite its

success, this film is largely inaccurate from the historical standpoint. In the film, during the attack the ships located on Battleship Row are arranged with space between them, when they were actually tied to each other. In addition, the Japanese Admiral Isoroku Yamamoto is aboard a battleship (Nagato) located in Tokyo Bay during the attack, and not in one of the battleships that conducted the attack as the film portrays. The most striking discrepancy is the appearance in the film of the USS *Arizona* Memorial located right above the sunken USS *Arizona.* The Memorial was built and dedicated over 20 years after the Attack in April, 1962. Another surprising fact concerning this film is that the many of the scenes were filmed in California and not Hawaii. So, in Pearl Harbor, Hollywood came to Pearl Harbor Shipyard while in California's studios.[vi]

"In Harm's Way" is another classic released in 1965, starring John Wayne, and Kirk Douglas. In this film, John Wayne, as Captain Rockwell Torrey, is reprimanded for taking miscalculated actions against the Japanese during the attack and has the chance to later redeem himself and move to the rank of Admiral. The film begins the night before the attack during the Officer's dance and gives a brief display of the attack without even mentioning the Japanese planning process. Although "In Harm's Way" has little historical value, due to the fact that it is based on a novel by James Bassett, it was almost entirely filmed in Hawaii. Moreover, it is the only film that shows footage of the repairs done in the Shipyard after the attack. [vii]

Pearl Harbor Navy sailors and Shipyard workers had the opportunity to see all the movies mentioned above and many more at discounted price. One of the main pathways for Hollywood to reach Pearl Harbor Shipyard was Sharkey Movie Theater. Located on Pearl Harbor Naval Station, Sharkey Theater opened around 1921. In its early stages it served multiple purposes. It was of course primarily used for the popular films of the time but was also utilized as a location for briefings, award ceremonies and all sorts of meetings. Before the creation of the submarine base chapel in 1944, Sharkey Theater provided a more than suitable place for Sunday Mass. According to Karen S. Spangler, Assistant Editor of Hawaii Navy News, besides movies, the theater's most popular entertainment were illegal and unregulated boxing matches, also known as "smokers." Indeed, in the early 1920s, boxing matches were very popular among Navy sailors and "Sharkey Theatre became the first covered boxing ring in the Territory of Hawaii, although at the time, boxing was prohibited by territorial law. The law was changed in 1929."[viii] The theater was supposedly named after Tom Sharkey, a well-known heavyweight boxer who began his boxing career while serving in the Navy at Pearl Harbor as a Master of Arms on the USS *Philadelphia*. His match against Jim Jeffries on November, 1899, was the first boxing event to be ever recorded by a movie camera. Thomas Sharkey died in 1953. His head stone reads "Thomas Sharkey, California, MAAS U.S. Navy, January 1, 1871-April 17, 1953."[ix] After the Japanese attack, Sharkey Theater was instrumental to the morale and recreation of Navy sailors as well as civilians working on the Shipyard. Sharkey Theater is currently located in building 628, continues movie showings at discount prices, and provides a site for other events such as the Armed Forces Bodybuilding Championship.

Just as Thomas Sharkey, many celebrities seen on the big screen and probably in Sharkey Theater were prior enlisted or officers in the Navy. Some even served during the attack on Pearl Harbor and World War II. Here is a partial list of some great Hollywood actors involved in the Navy: Henry Fonda, who played in both "Midway" and "In Harm's Way" as Admiral Nimitz, enlisted in the Navy as a quartermaster aboard the USS *Satterlee*. During his three years of service, he was assigned to an intelligence unit in Hawaii Central Pacific Command as a commissioned officer where he earned a Presidential Unit Citation and a Bronze Star. Humphrey Bogart, who appeared in "The Caine Mutiny" as Lieutenant Commander Phillip Francis Queeg, served in the Navy during the end of World War II aboard the USS *Leviathan* after he was expelled from prep school. He began his acting career while he was in the Naval Reserve.[x]

Ernest Borgnine is another celebrity who played in "The Dirty Dozen" and the comedy television series "McHale's Navy." He joined the Navy right after he graduated from high school in 1935. He was discharged after six years of service in 1941 before the Japanese attack but reenlisted shortly after to fight in World War II on anti-submarine duty in the Atlantic until 1945. In 2004, he received the promotion to the rank of Chief Petty Officer from Master Chief Petty Officer of the Navy Terry Scott for his lifetime support of the Navy family.[xi] Douglas Fairbanks Jr. was a famous Hollywood actor and a well decorated World War II Navy officer. During the War, he was assigned to an English Commando unit and was in charge of the Beach Jumper program, consisting of amphibious landing attack simulations in order to deceive the enemy. For his service

"Pearl Harbor" Panorama number 6 January 1944. The Robert F. Walden Collection.

Douglas Fairbanks received the United States Navy's Legion of Merit with the bronze V device for valor, the French Legion d'honneur and the Croix de Guerre, the Italian War Cross for Military Valor, and the British Distinguished Service Cross. After World War II, he concurrently served in the naval reserve and pursued his Hollywood acting career until he retired in 1954, as a Captain. [xii] Finally, Jason Robards Jr., who played Ulysses S. Grant in "The Legend of the Lone Ranger," served in the Navy for over five years. He was actually onboard the cruiser USS *Honolulu* during the December 7, attack and was deeply involved in battles in the Pacific theatre during World War II. He relates his expe-

rience during the attack:

"Our cruiser, the USS *Honolulu*, was just across the channel from "Battleship row" when the Japanese turned loose all hell. It was about 8 in the morning and most of us were just getting up, taking our time getting dressed for Sunday breakfast. Then we heard the booms. We rushed topside to see what the racket was all about. By now, our P.A. system had started, 'Air Raid! This is no drill! Air Raid! This is no drill! For the first few minutes — total chaos. Guys grabbing their clothes and whatever gear they could find; guys running in aimless directions; guys shouting orders; guys ignoring them. Somehow out of all this insanity our gun crews got to their stations and started firing. I headed for my post, the radio and communications center, as fast as possible. What we were to find out later was that by this time the USS *Arizona* and her 2,200 men were well on the way to the bottom of Pearl Harbor. The *Oklahoma* was listing heavily to port. The decks of the *West Virginia* and *California* were almost awash. Everywhere was fire and smoke and more black smoke from the burning oil. It was while we were making an effort to cast off and sortie that a Japanese dive bomber zoomed in on us, its bomb blasting the concrete pier on the ship's port side and piercing the oil tanks, warping her bulkheads. We could no longer participate in the defensive assault. When the order to sortie was given, a crewman not only chopped the casting lines, but severed also the power lines of the cruiser. Our guns could not be fired."[xiii]

It is difficult to know if Pearl Harbor and its Shipyard would have attracted so much of Hollywood's attention without the Japanese attack. Nevertheless, all the films relating to Pearl Harbor during the early 1940s, contributed to the education of people throughout the world, regardless of their accuracy. Hollywood offered great opportunities to know what happened on December 7, 1941. The variety of Hollywood movies attracted a diversity of audience based on the plot, the action and even Ben Affleck. It is also pleasant to know that some of the actors that we admire for their performance in Hollywood served and fought in our military.

Notes

[i] Lyndall and Donald Landauer. *Pearl: The History of the United States Navy in Pearl Harbor*. (Lake Tahoe, CA: Flying Cloud Press, 1999), 113

[ii] Ibid

[iii] Edward Raymer. *Descent into Darkness: Pearl Harbor, 1941, a Navy Diver's Memoir*. (Novato, CA: Presidio Press 2001), 39.

[iv] Toshio Masuda. *Tora Tora Tora*, September 1970.

[v] The Internet Movie Database http://us.imdb.com/title/tt0066473/ Jan 2008

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[xi] Ibid http://us.imdb.com/name/nm0000308/ Jan 2008

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ACTS OF COURAGE: THE PEARL HARBOR NAVAL SHIPYARD WORKERS OF DECEMBER 7, 1941

By Phillip Martinez

The bombing of Pearl Harbor is famous for being one of the most devastating attacks ever committed against the United States and also marked America's entry into World War II. The morning of December 7, 1941, started off like any other day in Hawaii. The sun had barely risen over the lush green mountains of Oahu and the Sunday morning weather was just beginning to warm up. Many were still in their beds recovering from a night out in town. It was just another peaceful day in the paradise islands. That peace would be decimated at 7:53 a.m., when the first Japanese bomber attack wave reached the harbor and released an onslaught of bombs and shallow water torpedoes on their U.S. Navy targets. They exploded mercilessly against the hulls and decks of the great battleships and destroyers which were reduced to sitting ducks in the narrow confines of the harbor. In the end eight battleships were damaged and five were sunk. The casualties suffered (as statistics vary) included 2,335 servicemen and 68 civilians killed with 1,178 wounded. Included were the 1,104 sailors aboard the USS *Arizona*, which suffered massive and catastrophic explosions when a 1,760 pound bomb penetrated the forward ammunition magazine. Since that fateful morning, many stories have been well documented on the heroic exploits of the men and women of Pearl Harbor. The brave sailors who risked their own lives in order to save others have received many accolades as result of their actions. However, little is known about the brave Shipyard workers, whom also deserve praise and honor for their acts of courage under fire. The following will focus on several of the heroes of the Pearl Harbor Naval Shipyard and their selfless and thankless acts on December 7. May they be honored and remembered always.

The following story is an interpretation based on actual events from the article, "No Medals for Joe," by Simon Mayo. Joe Bulgo was a 21 year old Shipyard worker. As he passed through the gates of Honolulu's Pearl Harbor Navy Yard he yawned at the big empty shop buildings and repair basins. It was early so everything was still somewhat deserted. Further in the distance lay the entire Pacific Battleship Fleet nestled peacefully at anchor. Joe was six feet tall with thick arms and he was a tireless worker who always seemed to have a "can do" attitude. His plan of the day involved caulking and testing a newly built Destroyer Class sea valve on the USS *Shaw*. After he was done changing into his dirt encrusted work clothes, he pulled out his famous pneumatic hammer; the largest one in production. The huge chipping gun had a tendency to fly out of the hands of anyone else who tried to use it, but not Joe's. "The Star Spangled Banner" could be heard coming from the ship's band when the familiar and often annoying drone of aircraft filled his ears. As he looked up, he saw the patterned flying formations across the harbor and assumed that it was probably an Army exercise. He was a little taken aback at the sheer number of planes and wondered why they were training so early on a Sunday morning. Boom! Boom! Within seconds, great plumes of water began to appear in and around the hulls of the ships and it was in that instant Joe saw the "Rising Sun" painted on the wings.

All hell broke loose. Joe ducked for cover as the shrieking planes swooped down low bombing and shooting at the docks and harbor. Suddenly the USS *Shaw* shuttered with a tremendous force. When he looked, the bow had been almost completely blown off. Torpedoes slammed into the USS *Oklahoma*. The USS *Arizona* exploded in a huge fire ball. The U.S. Pacific Fleet was being decimated rapidly and systematically. Two hours later, the Japanese planes flew off into the eerie silence leaving death and utter chaos in their wake. All the Shipyard workers were furious. They wanted to fight back, but they did not have any weapons. "Joe! Get down to *Oklahoma* now! They need you!" yelled his supervisor.[i] So with these new orders Joe was off on the next launch across the channel. Along the way Joe stood in shock and disbelief as the fatally injured battleships continued to sink while releasing huge clouds of black smoke into the blue sky. Many were already settling to the bottom of the harbor. The floating dead bodies numbered in the hundreds. The USS *Arizona* was making its last effort to float, as its twisted superstructure blazed in inferno. Finally Joe reached his destination.

The USS *Oklahoma* was now completely on its side. All that was left was the huge hull sticking out of the shallow water. Already standing on the hull and chipping away were Joe's chipping crew from Shop 11.[ii] The USS *Oklahoma* had suffered at least three torpedoes before the battleship had

capsized.[iii] Its masts had hit the bottom of the harbor floor and some 400 sailors were still inside tapping on the metal beneath his shoes.[iv] The workers tried desperately to chip their way into the ship's hull but it was very cumbersome and rudimentary. Joe found out that the crew had tried to burn through the metal but a wood lined compartment had caught fire and killed all the men inside. He started up his gun and began to cut into the bulkhead. He finally was able to bend out a patch which gained him access into the ship. The interior was boiling hot and afforded him very little breathing air. He kept looking for a way to get to the trapped men but the ship had been turned upside down and it was nearly impossible to tell where the tapping was coming from. Joe and his crew would go on to hit oil tanks, dead ends and waste tanks in their efforts. Little by little they were letting the remaining air pockets out of the ship, which would cause the ship to sink faster due to increased water levels. The more cuts that were made, the closer the men trapped inside became to drowning.

The work was immense as Joe opened up compartment after compartment. Sometimes he would come across the bodies of sailors in passageways, but he had to keep going. Whenever he would stop for a moment's rest, the desperate tapping of the trapped men would be enough motivation for him to keep pushing through. As night time fell, the sound of the chipping guns continued in the darkness. There was no light aside from the ambient burning flames coming from the destroyed USS *Arizona.* Hull lights were not allowed for fear of a second Japanese attack.[v] At around midnight Joe and his crew hit a fresh water tank and after drilling out the bottom, they found a shaft. A way in! Joe was lowered little by little down into the tank with only a small cage lantern. Suddenly, the ship began to groan and shake. If the ship shifted Joe knew he was a goner, but he fought the urge to turn back. Then he heard the tapping once more. He was close! He tapped back with his chisel against the bulkhead. An answer clanged back. Joe saw a manhole, lifted the cover and entered. Joe tapped again. Suddenly a voice cried out: "Please hurry! The water is rising!"[vi] Joe's chipping gun rattled into the bulkhead creating a small hole. With a whoosh, air escaped and the sailor's fingers could be seen trying to stop it. "Move your fingers!" Joe yelled, I'm going to do this fast!"[vii] Joe had never cut so expeditiously in his life. As the water rose to Joe's waist he started pleading with the stubborn metal, "c'mon, c'mon." After he cut three sides he was able to pry open the steel and with a rush of water, out came the trapped sailors smeared in oil. They could hardly move after being trapped for 20 hours and none had enough strength to get to the hatch.

Joe had no choice but to carry them individually. He picked one of the kids up and carried him to the other workers on his broad shoulders. He lifted all of them to the hatch and one by one the other workers pulled them to safety. By the time the last sailor was pulled out, the water level was up to Joe's neck. Joe and his crew worked tirelessly for four days and nights. In the end they saved 32 lives altogether. Later that year, Joe and some other members from his Shop 11 crew were awarded Navy Citations for brave and heroic work with utter disregard for their own personal safety. Joe never saw any of the men that he had saved and regretfully he never got the chance to even talk to any of them. But if it was not for Joe and the crew from Shop 11, those men would not have lived.

Ralph Walten described the scene vividly in the article, "Three, From a Long List of Brave Acts." George Walters was a 02 Engineman on December 7, 1941. On that morning he was operating a mobile shipyard Jib Crane. His main task was to haul yard equipment and parts to the yard workers area of operation near Dry Dock #1.[viii] The battleship USS *Pennsylvania* and destroyers, the USS *Downes* and USS *Cassin* were all berthed here.[ix] When the Japanese bombers attacked the Naval Shipyard, Walters began moving his crane back and forth on its tracks in an effort to shield the helpless ships. The gunners shooting from the portside of the USS *Pennsylvania* cursed Walters at first. They felt that he was being more of an interference than any kind of help. Since the ship was in the dry dock the sailors' views were blocked off by the dock walls and buildings. By the time the planes became visible, it was too late. However, George was perched high above the dry dock and in his operators cabin, he had a great tactical vantage point. By following the movements of George's Jib Crane, they were able to effectively estimate the direction of the next oncoming plane. More effective counter fire was the result and had it not been for the brave acts of George, perhaps the USS *Pennsylvania* would not have lived on to claim her revenge later in the Pacific War.

Meanwhile, over at Pier Bravo 12, Douglas Frias was walking onto the oil tanker USS *Ramapo*.[x] Doug was the leading shopfitter and senior civilian supervisor for a small crew from Shop 11. It was unusual for them to be there on a Sunday but not unheard of. If the job needed to get done, you could depend on the Yard workers to "get 'er done."

Dry Dock #1, smoke still bellows in the background from the USS Arizona. Official U.S. Navy Photo.

Suddenly there was a loud screeching sound that was easily identifiable as diving planes in unison. Immediately the planes began shooting and strafing. Frias zigzagged all the way across the street in an effort to create a more elusive target for the bombers. Once inside his shop, he quickly worked to extinguish a fire near a loft that had already started burning furiously. Immediately following the bombing, Frias rushed over to the 10-10 dock to help unload all the wounded and dead men from small boats. The boats were making trips back and forth down battleship row, where most of the damage had been done. After roughly seven months, Frias, who was then promoted to a Quarterman, played an integral and crucial part in organizing the 1,400 man crew responsible for the complete salvage and repair of the severely damaged aircraft carrier, the USS *Yorktown*. They did this feat in a jaw-dropping 48 hours.[xi]

An Electrician Quarterman named Alton Kirkconnel had worked the midnight shift and was still in the shop 51 when the attack began.[xii] The bombs that exploded in and around Dry Dock #1 were shattering all of the glass windows in the building. For the men who were trapped in the shop, "flying glass was our biggest danger during the whole attack on the USS *Cassin* and USS *Downes*," said Kirkconnel.[xiii] The sound of anti-aircraft guns were still popping off in the distance and Kirkconnel and the men in his crew repaired the either damaged or water-soaked fire control instruments from the damaged ships. Amazingly, Kirkconnel worked for more than 48 hours before he headed out for home and some much needed sleep.[xiv]

The next account of what happened is from a former Shop 67 electronic mechanic named Warren Verhoff. On the morning of December 7, 1941, Warren was just a 20-year-old Radioman 3rd Class.[xv] He and his crew were responsible for assisting the tug boats in operations in and around the harbor. Warren was onboard the tug boat USS *Keosanquak* that morning. Just as they reached Hospital Point one of the gunner's mates spotted incoming aircraft. The sight of planes over the harbor was not unusual since dive-bombing drills were held periodically, however, this was different. Looking at the aircraft he could clearly distinguish the famous "rising sun" symbol on each wing. "Those are Jap planes!" he yelled.[xvi] They came in low and slow barely floating in," recalled Verhoff. "They came from Aiea and turned toward the battleships and the first wave dropped their fish on them," he said.[xvii]

"I could see the flames and black smoke going up right down the line and we all wondered which ship it was," said Verhoff. As the USS *Keosanquak* continued out to sea, "we

got strafed a couple of times."[xviii] Once, after a plane had dropped its torpedoes, it buzzed our tug. He was close enough to smile at me," said Vernhoff. "He then dipped his wings and came back to strafe us." You never knew where they were going to hit," said Vernhoff. "You could hear the bombs falling and everyone would stop and hold their breath… then BOOM!"[xix] The tug returned to Pearl Harbor while the massive bombing continued. Verhoff saw "a couple of destroyers, guns blazing" and an enemy plane go down over Hickam. But, Verhoff said, "the big damage had been done." "We started putting up nets to protect the piers while fighting fires and pulling dead bodies out of the water. There were bodies floating around all over the place".[xx]

Sixty-eight years ago Japanese warplanes rained death and destruction from the skies above Pearl Harbor. The peace and tranquility of a tropical morning erupted into a horrifying day of infamy. At the Pearl Harbor Naval Shipyard, the passing of time has wrought a multitude of changes. New buildings and even newer machinery, technology and skills undreamt of in the past have continued to mold and shape the yard. The 26,000 men and women who once filled the streets and shops during the war that followed the attack are now long gone. The majority of present day Yard workers had not even been born. To most of us, the attack is summed up as what we see on TV or what we read about in books or articles. But for those who actually lived through the bombs and bullets that day, those memories will live forever in their stories. With their own eyes, they saw the warplanes with the "Rising Sun" painted on their wings screaming over their heads. They witnessed the torpedoes and bombs tear into the proud ships of the fleet, ripping apart metal and men in thunderous explosions of smoke and flames. They smelled the burning oil and fumes of the fires; felt the shock and then the anger course through their souls; heard the cries of the wounded and dying. They will not and cannot forget. We must never forget. For present-day Shipyard workers, December 7, 1941 is a reminder of why they are here. They should all have an instilled sense of heritage and stand tall and proud because they are here to keep America strong.

Notes

[i] Mayo, Simon. "No Medals For Joe." *Readers Digest*, December 1990, 35.
[ii] Mayo, 37.
[iii] Ibid.
[iv] Ibid.
[v] Ibid.
[vi] Ibid., 38
[vii] Ibid., 38
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[xv] Kim, Mark. "Emotions of Dec. 7 Attack Still Clear." *Shipyard Log 50th Anniversary* 44, no. 25 (1991): 4.
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Dry Dock #1, smoke still bellows in background from the USS Arizona. Official U.S. Navy Photo.

THE SOCIAL LIFE AND ACTIVITIES OF THE PEARL HARBOR NAVAL SHIPYARD: WWII AND TODAY

By Marcia W. Vanderwood

Social activities prior to the 1940s at the Pearl Harbor Naval Shipyard were fun and smallish and a familial feeling in the community prevailed. Then occurred the terrible attack on Pearl Harbor. The effect on the community was devastating. When writing about the attack, author Gordon W. Prange describes Admiral Kimmel's (Commander and Chief of the United States Fleet) reaction:

"…Much as the loss of his ships grieved him, what really tore his brave heart was the death and suffering of his men. These were not the neat rows of statistics to Kimmel. In that day the United States Navy was a small, neighborly community where almost everyone knew everyone else. A man might enlist on one ship and stay with her until he retired twenty or thirty years later. Comradeship at Annapolis, service together and family intermarriage bound the officers with ties none the less binding for being intangible."[i]

This was when the Pearl Harbor Naval Shipyard became a major focus of the Navy. Repair of ships and submarines was paramount and they began shipping in men by the thousands. It also became an issue as to where to house them, how to feed them, and how to transport them, among other challenges. Society in the Pearl Harbor Naval Shipyard was about to transform. Although it took a year or more to develop the community and to improve their stoic and sparse conditions, it seems they found a way to retain much of that "hometown/family" quality in the new, larger and bustling lifestyle.

"In the immediate months following Pearl Harbor, new workers arrived so fast that it was next to impossible to provide more than the bare necessities to the men. The food wasn't of the best, the barracks were just that, and outside of a small movie in a wing of the messing club, there was no entertainment whatever: The way we were working, there was no time for rest or relaxation; there was time for nothing but hard work and hard living and preparing for the next visit of our little yellow friends."[ii]

February 15, 1942, was the arrival of the first shipload of new workers at the Shipyard at Pearl Harbor.[iii] As one worker described it:

"We shall never forget our first sight of Pearl Harbor. We were permitted topside…just as she steamed past that terrible row of sunken battleships off Ford Island. Even the hubbub of disembarkation could not completely dispel the sober quietness which had followed."[iv]

Further statements described the conditions of the work: "The jobs we had to do were mostly in the stink and slime of rotting barnacles and oozing oil, on ships whose sides had felt the smashing blows of Jap torpedoes and whose decks and bulkheads had been torn and split and burst asunder by exploding Jap bombs. Twelve and fourteen hours were the rule of the day, and sixteen to twenty-four hours at a stretch were by no means rare."[v]

It was said of the workers that they "…willingly and cheerfully accept the most difficult and disagreeable jobs assigned to them and do the work in record time. Yet, there is not a worker who would dare brag or boast of what he has done when so many gave so much more on these very ships the first day of the war."[vi]

In those days the workers barely had time to eat in the mess hall and climb into their bunks for a few minimal hours of sleep before doing it all again the next day. One of the most vehement complaints was that, "The laundry had given up the job of trying to keep regular hours and it was the lucky lad who could get his laundry in three weeks."[vii] However, in 1943 a new laundry was built that was projected to handle the needs of the entire area of the new Civilian Housing Area 3 (CHA3) which was the housing for the Shipyard workers.[viii]

Although they worked most of the waking hours, "everyday life also was changed by "such things as the blackout, late mails, shortages, and the like...." Blackouts meant that no lights were to be on inside houses or shops and everyone had to cover up their windows at night with black material. This was to make it difficult for bombers to find their target in the dark. The street lamps were turned off and often people bumped into one another. Traffic accidents were common because car headlights had to be blacked out, and deaths from drowning increased as people fell off bridges or walked into ponds."[ix]

In the memory of one worker, "…Blackout was a spine-tingling word to most swing and third-shift men. We all recall the many alerts which we had…how seriously everyone took the alarms. For there was definitely 'something out there.' Nowadays the blackout is easing up more and

Photo of Shipyard restaurant demonstrating large number of meals served, 1940s. Official U.S. Navy Photo

more. Let's hope the bleak days of 'douse that cigarette' never return."[x]

The islands endured nearly 19 months of blackout from 1941 until the summer of 1943, when the orders regulating blackout were modified; all restrictions were finally rescinded on July 21, 1944.[xi]

War bonds, blood drives, and gas masks were also part of everyday life. Tallies of war bond purchases were kept for organizations and communities and there were bond booths everywhere.

"The first Series E Bond was sold to President Franklin D. Roosevelt by Secretary of the Treasury Henry Morgenthau on May 1, 1941. During World War II, many of Hollywood's most popular celebrities participated in bond drives to aid the war effort. The war bond campaign has been called a unique fusion of nationalism and consumerism. They offered Americans a financial and moral stake in the war."[xii]

Gas masks were to be taken everywhere. There were civilian issued masks and military issued. Although the military issued masks were more durable, both types contained the same chemical agents in the canister. Civilian masks were "good for at least 40 hours in gas concentration."[xiii] It was considered idiocy to leave one's mask at home.

Although the food in the mess halls (cafeterias) was not commonly bragged about, they did open new facilities, making three altogether, which combined, were able to easily handle 2,000 meals per hour, with expansion already in the workings.[xiv] At the height of the war, there were approximately 25,000 workers in the Shipyard.[xv] One of the "funniest incidents ever to occur in the old Naval Cantonment was the 'March of the Soapy Soup Bowls." Someone accidentally (?) dropped a box of dish soap into the soup, and the mess hall fed it to the workers anyway. Dozens of men marched across the street to the "grievance officer" and yelled at him and made him taste the "dishwater." He had to holler for help to handle the mob.[xvi]

A coffee shop was made available for those who, during the hot weather, preferred to eat a lighter meal than the heavy meals served in the cafeterias. It featured hamburgers, hot dogs, pastries, ice cream, and fresh milk. It did an excellent business.[xvii]

Transportation was principally by bus. "Before dawn, at 5:30 a.m., the first bus of the day left for the Navy Yard carrying CHA3 defense workers exclusively."[xviii] By mid-January, 1943, "CHA3 'Coral Sea' class buses reached a daily passenger total of over 5,500 and the number of the huge semi-trailer buses named after United States Naval victories of this war… increased to 12." [xix] Still, this was not enough to handle the needs of the growing CHA3 workers

and additional buses were ordered and would be delivered in the near future.[xx]

One of the many tests of patience, because of the constantly growing number of workers, was the interminable lines that had to be navigated. They began from the moment they arrived at the Shipyard to in-process and from there to the long lines in the cafeterias, and other daily routine stops. One story recalled was how the promise of a "real, live, genuine Hawaiian Hula dance drove most of the boys wild. It was barracks jabber for days before the actual event itself…We, unfortunately, were in one of the six lines which waited patiently to get in, only to be told to reverse ourselves and head elsewhere—no more room!... It is unknown to this day whether the ensuing riot was a planned-in-advance amusement of the USO; but it was certainly the most beautiful show ever staged in the Cantonment and one we all immensely enjoyed."[xxi]

Mail from home seemed the most pressing need for the workers and many articles, poems and anecdotes in the weekly paper focused on the universal craving the young men had for news from home. The need to identify with home led to the forming of organizations of groups according to the state they claimed as their own. The local paper listed the newest incoming workers each week according to their state. These groups held many regular activities together; particularly popular were picnics and sports events. In one example, the California state club issued a challenge for a tug-of-war to the other state clubs for the 4th of July events of 1943.[xxii]

Sports became a definite priority for the workers and there quickly became many organized programs, some quite sizeable. There were bowling leagues (5 man teams) in Honolulu, swimming on weekends, badminton (indoor and outdoor), a basketball league playing games six nights weekly, baseball teams in the Honolulu Baseball League, and the very popular boxing. Golf was enjoyed as well as other sports such as hiking, horseshoe pitching, softball, tennis, table tennis, shuffleboard, volleyball, and weightlifting. Fishing was another favorite where trips for 10 or more were arranged as often as conditions could warrant.[xxiii] Wrestling and archery made their debut as well.[xxiv] And for those who sometimes preferred mind exercise to physical, there was also a chess and checkers club.[xxv]

There was a theater with live performances "by actors from the Area." [xxvi] Numerous plays were performed; including Shakespeare's "Taming of the Shrew."[xxvii]One melodrama gave 2,000 men a sound lesson on the evils of strong drink in the packed recreation hall New Year's Eve. Rear Admiral W.R. Furlong, Commandant of the Navy Yard, was an honored guest in attendance and thoroughly enjoyed the show. Since strong drink was hardly available, it took little determination to follow the play's admonitions![xxviii]

Movies were always welcome at the Shipyard and were held nightly, usually a different feature each night of the week and occasionally there were double-features. The movie schedule was printed every week in the newspaper. Stars such as Victor Mature, Laurence Olivier, Humphrey Bogart, Laurel and Hardy, Rita Hayworth, and James Cagney were regulars. There were no ratings at that time and all movies were considered appropriate for all ages.[xxix]

Sightseeing for the workers on the island was so popular, especially for the day-long bus tours around the island of Oahu, that they increased the busing facilities to try to accommodate the growing numbers of those who wished to tour.[xxx] Other well-liked places to go were Hanauma Bay and the peaceful Kokokahi Rest Camp:

Kokokahi Rest Camp was opened to war workers of Pearl Harbor and CHA3 and was intended "primarily for those who do not have permanent homes in Hawaii. For two dollars a person may spend one day and one night at the camp, eat three meals, have the use of a cottage and shower, and the use of all facilities, which include swimming, fishing, all sports, indoor recreation in various forms."[xxxi]

The camp, located in Kaneohe, could be reached by bus or taxi. The Recreation department of CHA3 offered full cooperation to men who desired to go and offered transportation to any groups numbering 12 and above.[xxxii]

USO dances were held weekly and sometimes bi-weekly and there were opportunities to perform in a live orchestra. The War Bond Orchestra at the Navy Yard provided music and entertainment for the employees during the noon hour. [xxxiii]

War is often a somber time to reflect on life and beliefs and the Shipyard was no exception. Religious meetings on Sundays and non-denominational Bible classes other evenings of the week were available with the schedules printed in the newspaper.[xxxiv] In addition, Catholic men of the Pearl Harbor Holy Name Society also held meetings and membership drives.[xxxv]

During the war, many performing artists were very patriotic. They chose to either take their shows on the road and visit the military on the battle fronts and support them by boosting their morale, such as Bob Hope did, or to actu-

ally join the military themselves to do their duty for their country. Artie Shaw, very famous in jazz circles as a clarinetist and writer, chose to do both. He joined the Navy and subsequently his whole band joined as a playing unit. He and his band visited and performed for the Pearl Harbor Naval Shipyard in February of 1943.[xxxvi]

"After finishing boot training, he was asked to form a service band which eventually won the national Esquire poll. He spent the next year and a half taking his music into the forward Pacific war zones, playing as many as four concerts a day throughout the entire Southwest Pacific, on battleships, aircraft carriers, and repair ships, ending with tours of Army, Navy, and Marine bases (and even a number of ANZAC ones when his band arrived in New Zealand and Australia). On returning to the U.S. — after having undergone several near-miss bombing raids in Guadalcanal — physically exhausted and emotionally depleted, he was given a medical discharge from the Navy."[xxxvii]

When the war finally ended, the Shipyard began sending its valiant workers back home. The years and the decades rolled by, and now the Pearl Harbor Naval Shipyard, still carrying on its duty to repair ships and submarines, supports approximately 4,500 workers.[xxxviii]

Although the Shipyard has been drawn down to a much smaller entity than it was during the war, it is still involved heavily in the community of Honolulu. Shipyard workers actively participate in many volunteer projects throughout the community such as record breaking donations to the Combined Federal Campaign to which last year was donated $693,000 from the Pearl Harbor Naval Shipyard alone.[xxxix] They also donate to other community projects such as the KHON2 Lokahi Giving Project[xl] as well as volunteering their time working with students in the National FIRST Robotics competitions[xli] and the Lego Company First Lego League "Power Puzzle" Challenge.[xlii] They also provide jobs for the handicapped and participate in the "Adopt a Highway" program.[xliii]

The Shipyard continues the traditions of participating in competitions for many sports including bowling, baseball, basketball, and others and has trophies that date back to the 1930s still displayed in its shops.[xliv]

Instead of cafeterias, they now may select their meals from an array of catering trucks that frequent the Shipyard daily at lunch time providing a wide variety of choices.

As in World War II, community and social activities and a close-knit family feeling still hold high importance for the Shipyard. May 13, 2008 will mark the 100th birthday of the Pearl Harbor Naval Shipyard. As they celebrate their centennial and the achievements of the past, they also look toward the future and how they can better execute their continued mission, keeping the fleet "Fit to Fight."

Notes

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[iii] "Looking Backward: A Year at CHA3." *Pearl Harbor Banner,* 19 February, 1943, 4.

[iv] Ibid.

[v] "Looking Backward: A Year at CHA3." 5 March, 1943, 5.

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[xiii] "Gas Mask Valuable: You May Need." *Pearl Harbor Banner*, 19 February, 1943, 4.

[xiv] "New Mess Hall in Operation." *Pearl Harbor Banner, 16* January, 1943, 1.

[xv] Lecture by Kerry Gershaneck, representative from Pearl Harbor Naval Shipyard Public Affairs, to HPU students 14 January, 2008.

[xvi] "Looking Backward: A Year at CHA3." *Pearl Harbor Banner,* 19 February, 1943, 4.

[xvii] "Coffee Shop Now Open." *Pearl Harbor Banner,* 5 February, 1943, 1.

[xviii] "CHA3 Navy Yard Bus System Boasts New Terminal." *Pearl Harbor Banner,* 16 January 1943, 1.

[xix] Ibid.

[xx] Ibid.

[xxi] "Looking Backward: A Year at CHA3."*Pearl Harbor Banner*, 26 February, 1943, 4.

[xxii] "Californians Issue Challenge for Tug-of-War." *Pearl Harbor Banner,* 2 July, 1943, 5.

[xxiii] "What to Do…" *Pearl Harbor Banner,* 5 February, 1943, 4.

[xxiv] "Archers in First Competition." and "Wrestling–Judo Exposition Saturday in Recreation Hall." *Pearl Harbor Banner,* 26 March, 1943, 7.

[xxv] "Chess and Checkers Club Organizes." *Pearl Harbor Banner,* 30 January, 1943, 2.
[xxvi] "'Garter and Bustle' Ushers in '43." *Pearl Harbor Banner,* 16 January, 16, 1943, 1.
[xxvii] *Pearl Harbor Banner,* (picture caption), 5 February, 1943, 1.
[xxviii] Ibid.
[xxix] "Movie Schedule." *Pearl Harbor Banner,* 30 January, 1943, 1.
[xxx] "Island Tour Facilities Increased." *Pearl Harbor Banner,* 19 March, 1943, 5.
[xxxi] "Great Interest In Kokokahi Shown." *Pearl Harbor Banner,* 18 June, 1943, 6.
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[xxxiii] "CHA3 Orchestra Being Organised." *Pearl Harbor Banner,* 19 March, 1943, 5.
[xxxiv]"Bible Class to Meet In Chapel." *Pearl Harbor Banner,* 21 May, 1943, 6.
[xxxv] "Holy Name Men Plan Drive, Supper." *Pearl Harbor Banner,* 19 March, 1943, 5.
[xxxvi] "Artie Shaw and Band Here February 9th" *Pearl Harbor Banner,* 5 February, 1943,1.
[xxxvii] http://www.artieshaw.com/bio.html
[xxxviii] Greg Ng, Deputy to Pearl Harbor Naval Shipyard Operations Planning Manager Officer, interview on Feb. 15, 2008, 10:00 am.
[xxxix] Marshall Fukuki, "Combined Federal Compaign Record-Breaking $693,000 donated to charity." *Shipyard Log*, January 2008, 5.
[xl] "Lights, camera, action." *Shipyard Log*, January 2008, 5.
[xli] Marshall Fukuki, "Gearing up for high-tech careers." Shipyard Log, January 2008, 8.
[xlii] Bill Greene, "Learning through LEGO", Shipyard Log, January, 2008, 9.
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Part III, Technology:

THE DRY DOCKS OF PEARL HARBOR NAVAL SHIPYARD

By Levi Rowley

Throughout its history, Pearl Harbor Naval Shipyard has played a vital role for the Navy by keeping the ships ready to fight and repairing any damage that might be sustained. There is no argument that it was the steadfast work by the Shipyard following the December 7, 1941, attack that helped turn the tide in World War II. The Shipyard and all the employees worked courageously by performing the daunting task of picking up the pieces and resurrecting the damaged fleet. At the core of the Shipyard's ability to successfully service the fleet are its dry-docking capabilities. It can be argued that the Japanese committed a mistake in not destroying the dry docks at Pearl Harbor, which turned out to be one of the Navy's greatest assets.

The dry docks were in the plans since the appropriations act that allocated money from Congress to build Pearl Harbor. The Bureau of Equipment of the United States Navy Department acquired the Pearl Harbor Naval Station in February 1904. The purpose of the land was to be for a coaling station, but the Navy had other plans as well.[i] On May 12, 1908, Congress approved an act that made appropriations for the naval service by including an item reading; "The Secretary of the Navy is hereby authorized and directed to establish a naval station at Pearl Harbor, Hawaii, on the site heretofore acquired for that purpose."[ii] In addition to granting the land, Congress authorized the Navy "to erect all necessary machine shops, storehouses, coal sheds, and other necessary buildings, and to build one graving dock capable of receiving the largest vessels of the Navy, at a cost not to exceed two million dollars for the dock."[iii]

There are two types of dry docks, the large graving docks and floating dry docks. They are both designed to give the shipyard or the maintenance activity the means to remove the ship from the water in order to conduct repairs or routine maintenance when necessary. The graving dock is a large concrete basin large enough to allow ships to enter and have the water pumped out. The ship passes through the caisson which acts as the entrance to the dock. Ships enter the dock and are positioned over concrete blocks with wooden tips that are placed in pre-determined locations. Every ship is unique and will have a signature individual block placement. Once the ship is in the correct position the caisson, which essentially is a large hollow gate, is flooded full of water and locked in place at the entrance of the dock. The water is then drained from the dry dock using large pumps and the ship lowers with the water level until it rests on the concrete blocks. Once the repair is finished the dry dock is slowly flooded until the ship is once again buoyant. When the water reaches the correct level the caisson is pumped dry and the large gate opens allowing the ship to exit the dry dock. It must be noted that extreme caution is used during docking evolutions to prevent tipping over or flooding of the ship.

While the plans for the Navy Yard progressed, construction of the dry dock proved to be more difficult than anyone had initially envisioned. Large construction projects were immediately made more difficult when working in such an isolated area such as the Hawaiian Islands. Another aspect of building the dock was the location of the yard. While the location of the naval station was favorable and the ground was conducive for heavy concentrated loads, underground construction would be more difficult because of the porous nature of Hawaii's soil. In the case of Hawaii, the surface soil, to depths exceeding that of any part of the dock consists of volcanic or organic sediment. [iv]

The initial proposal allocated $2,000,000 for the construction of the dry dock. The Secretary of the Navy figured that this would only be sufficient to construct a dock only 850 feet long and recommended that $3,500,000 be authorized in order to increase the size of the dock to 1140 feet. The Secretary's plan would implement an additional caisson in the middle of the dock so that it could accommodate the largest navy ships, but also be arranged so that two chambers could operate independently of each other. While one side is flooded the other could be emptied and facilitate another ship. The Bureau of the Yards and Docks prepared the plans for a dry dock similar to the Secretary's idea that would make the dock 1191 feet in length, for this the lowest bid was $2,422.900. Congress refused to grant this amount of money and new bids were requested for a smaller dock with the same features. The San Francisco Bridge Company was ultimately awarded the contract to construct a 620 foot dock for $1,760,000 and work was commenced September 21, 1909, and due for completion November 22, 1912. [v]

In 1909, the Chief of the Bureau of Yards and Docks made his annual report recommending that Congress award more money to increase the length of the dry dock to accommodate a ship 800 feet long and dispose of the feature for another caisson. The report also stated that should the requirement of piling become necessary in order to remain within appropriation the dock would need to be shortened to less than 600 feet. The final result of such a dock would prevent the ability to service the new battleships. The length of the dry dock was reduced to 589 feet because the use of piling was necessary. The Act of June 24, 1910, increased the amount to $2,700,000 which allowed for a dry dock 791 feet long and 110 feet wide. In August of 1912, the plan was changed again to allow for a dock that would be 1008 feet long which could be completed for $3,178,621.61[vi]

Like many construction efforts that take place around water, a coffer dam method was used. Coffer dams serve as exclusion areas to enable workers to enter areas that are normally underwater. The dam is constructed and then the water is pumped out of the space. On February 17, 1913, the project was met with a terrible disaster. The Secretary of the Navy, Josephus Daniels, called it "the naval disaster of the year." [vii] The ground beneath the coffer dam was lifted up by underground pressure and the wall and the coffer dam collapsed. Table 1 illustrates the rate of uplift of the coffer dam was minor until the morning of the 17th and began to become alarming at 1:45 p.m. The dock wall lifted several feet according to eyewitness accounts. It was very fortunate that no lives were lost or anyone was injured. [viii] The accident concluded the work done on the dry dock project for the remainder of 1913, pending an official investigation.

It must be noted that local Hawaiian legend explains the collapse of the dry dock in its own way. Hawaiian legend states that Pearl Harbor is the sacred home to the shark goddess, *Ka'ahupaahau*. Old Hawaiians issued warnings of trouble ahead for anyone who violated the peace and hospitality of the region. Local workers complained the dry dock was being built on the site of a temple once dedicated to the shark goddess. She was the one who had made the dock collapse, and she would do it again unless appeased in some way. Instead of laughing off the request, the territorial governor William Frear suggested that since these were Hawaiian waters it would be prudent to respect the customs of the local race. When construction began again, a priestess came to Pearl Harbor and performed a ceremony which included tossing crackers on the water and said there would be no more trouble "so long as you call on the *kahuna* or priest for your great building."[ix]

TABLE 1.—DEPTH OF UNWATEKINC OF SECTION II, WITH CORRESPONDING TOTAL RISE OF CRIB.

Date, 1918	Hour	Depth below	Rise In Crib, In Feet:	
			AC west wall	At east wall
Feb. 6	0.00 ft.			
11	3.30 P. M.	5.50'	0.03	0.03
12	3.15 P. M.	9.50'	0.04	0.04
13	8.15 P. M.	12.25'	0.04	0.04
13	3.00 P. M.	16.50'	0.05	0.06
14	8.00 P. M.	16.50'	0.04	0.05
14	3.00 P. M.	20.00'	0.05	0.06
15	8.00 P. M.	24.50'	0.05	0.06
15	1.00 P. M.	25.50'	0.07	0.07
16	10.15 P. M.	32.50'	0.08	0.07
16	3.00 P. M.	32.50'	0.11	0.07
17	8.30 P. M.	34.00'	0.18	0.10
17	9.45 P. M.	84.25'	0.19	0.12
17	10.30 P. M.	84.75'	0.19	0.10
17	1.00 P. M.	85.50'	0.25	0.18
17	1.45 P. M.	87.05'		
17	2.30 P. M.	86.75'	0.66	0.15
17	2.40 P. M.	36.50'		
17	3.00 P. M.	Coffer-dam failed at about this time.		

The Navy Department arranged for Alfred Noble, a civil engineer, to investigate the disaster and make the final decision. According to Noble, the dry dock at Pearl Harbor could be salvaged and he submitted his plans to the Secretary. To locate adequate foundations it would be necessary to move the site of the dock 150 feet inland beyond the present location.[x] Congress granted a total of $4,442,115.43 to radically change the method of construction. The dry dock was completed in August 1919; it was 1002 feet long, 138 feet wide and 32 feet deep. Mrs. Josephus Daniels pressed the button at the opening ceremony to allow water to flow into the new dry dock.

The dry dock provided the Navy a means to repair ships damaged at sea and at the same time offered the people in Hawaii jobs in the Shipyard. An article ran in the Honolulu Advertiser in August, 1939, explaining that there would be a substantial increase in the work being performed at Pearl Harbor upon the completion of two new docks. Although the primary purpose for the graving docks was the emergency needs of the fleet, it was pointed out that the completion of the new docks would give Pearl Harbor the same dry-docking capacity as any West Coast shipyard. The Bureau of the Yards and Docks informed the authorities at Pearl Harbor on August 7, 1939, that the total cost would be $10,485,000 and would employ thousands of men in the construction. Admiral Claude C, Bloch, the

Commander in Chief of the Pacific, visited Honolulu in the spring of 1938 and declared the addition of new dry docks a vital war time factor in the operation of the fleet. He stated that while the completion of more graving docks at Pearl Harbor would prove to be a great convenience to the Navy in peace time, the possession of such dry-docking capabilities in time of emergency might be necessary for national safety.[xi] His theory would be put to the test three and half years later following the attack on Pearl Harbor.

The December 7, 1941, surprise attack on the U.S. Pacific fleet started at 0755 and lasted for a few hours. During the attack the Japanese planes sank or damaged 21 of the 96 ships located in the harbor. The attack did target the Shipyard and dry docks but the damage was concentrated and inflicted on the ships that were in dry dock at the time. The USS *Cassin* and the USS *Downes* were located in Dry Dock #1 at the time of the attack. The ships were hit and nearly destroyed. Pictures of the aftermath reveal the *Cassin* leaning against the side of the *Downes*. Initial impressions of the wreckage were that she was a total loss and the only purpose for salvage was to clear the dry dock. However, closer inspection showed that the main battery, hull fittings and machinery were all in good condition. Shipyard workers began to remove the guns and all the topside equipment in order to patch up the hull enough to make the ship float. The *Cassin* was righted on February 5, 1942, and floated out of the dock on the 18th. [xii]

Rear Admiral Furlong was the Commandant of the Navy Yard Pearl Harbor from December 12, 1941, to December 1, 1945. Obviously the most important task during this timeframe was to repair the damaged vessels in Pearl Harbor and prepare the fleet for battle during WW II. Pearl Harbor and the dry docks became the center for defense and offense in the Pacific. The Shipyard and dry docks became increasingly important and the men and women of Pearl Harbor worked around the clock. Badly damaged ships of Pearl Harbor were brought into the dry docks and yards as well as new ships from the mainland. The Shipyard and dry dock workers set repair records as they kept the fleet "fit to fight."[xiii]

The Shipyard experienced enormous workloads during the year following the attack. Civilian workers from the mainland came by the thousands to contribute what they could for the war effort. The Navy Yard expanded as the number of workers grew and the additional work was constantly being added to the work list. The yard built new buildings and facilities to accommodate the increasing work including plans for another dry dock, which would make four. Dry Dock #4 would be one of the world's largest docks when completed. Dry Dock #4 was completed in record time and in October of 1943; the dock was dedicated in a ceremony to Captain Robert E. Thomas. Admiral Nimitz addressed the crowd during the ceremony and called it "a magnificent achievement." [xiv] The new dry dock was so large it could accommodate the largest ships currently in service as well as those under construction. Before concluding his speech the Admiral emphasized that the new dry dock would play a vital role in winning the war. Admiral Furlong accepted the dock and said that "its completion increases further the importance of the Hawaiian Islands as a strategic outpost of the United States." He went on to add "the continuous use of Pearl Harbor docks and the great number of ships docked here is one of the proud records of this navy yard."[xv]

During WW II, the Shipyard and the ability to drydock the damaged ships was essential for victory in the war. It was because of these capabilities that the United States Pacific fleet was resurrected. Without the use of the dry docks the damaged ships would not have been repairable within appropriate timeframes. Today, the same dry docks built during the first and second World Wars are used to keep the fleet ready to fight. Many of the functions the Navy facilities including the dry docks were built to service no longer have any uses to meet the modern needs of the Navy. The Navy has new ships and submarines that require modern technologies and support.

The fact that the Pearl Harbor Naval Shipyard holds a special spot in history may also contribute to the difficulty of staying open. Today the Navy has new ships, and the Shipyard is from another era. The difficulty lies somewhere in the middle of preserving history and adapting to serve the needs of the modern Navy. The Navy said the old buildings and support facilities make up 300,000 square feet of unusable space, but the entire area is a National Historic Landmark and to make any changes requires a historic preservation review.[xvi] "We are working closely with our historic partners, but this is a shipyard, not a museum," said Kerry Gershaneck, Congressional and Public Affairs Officer for the Pearl Harbor Naval Shipyard.[xvii] Gershaneck also said "Our mission is to keep the Pacific Fleet fit to fight and to do this we need state of the art facilities and technology. We will do what we can to preserve the skyline, but we will also do what it takes to keep our fleet combat ready."

In 2005, the Pearl Harbor Naval Shipyard was added to

a list of possible base closures and that became quite a scare for the state of Hawaii. The possible closure encouraged the Shipyard to do whatever feasible for modernization of the complex. If the Shipyard and dry-docking facilities shut down, 4,800 people would lose their jobs and the Navy would lose a very strategic military base. Congress failed to pass a 2007 military construction bill and chose to continue the 2006 levels. It discarded the funding set aside for projects including $22 million in renovation funds for Dry Docks #1 and #2. The funds will be requested again in the 2008 defense budget and the Shipyard may be given the chance to adapt and compete as the industrial leader it has become. [xviii]

About 30 percent of the Shipyard's work is fast response and 90 percent of that work is on submarines which require the use of the dry docks. Recently, the Navy Secretary Donald Winter came to Pearl Harbor and said the possible closure of the Shipyard is "in the past" and the Navy is committed to maintaining Pearl Harbor. Long term plans for modernizing the Shipyard and dry docks are in the works. Hundreds of millions of dollars for improvements will be requested by 2030 so that Pearl Harbor Naval Shipyard can serve the fleet for another 100 years. [xix]

Notes

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PEARL HARBOR NAVAL SHIPYARD: KEEPING THE FLEET MOVING FOR 100 YEARS

By Tobias I. Scott

Pearl Harbor Naval Shipyard has a long and storied past. From its humble beginnings as a simple coaling and repair station during Hawaii's territorial years to being a first-rate maintenance and repair facility for the cutting edge U.S. Pacific Fleet, the Shipyard has stayed abreast of naval technology to provide whatever services necessary to keep the fleet operational. It has only been 100 years, but the Yard has come from the end of the age of sail to highly advanced nuclear propulsion submarines.

During the early 19th century the United States was gaining in naval technologies and shipbuilding, but after 1865 progress slowed and the U.S. Navy began to lag behind the European powers in development of new propulsion and shipbuilding designs. In 1881 an English magazine quipped that the U.S. Navy was nothing more than "three mud-scows supplemented by a superannuated canal-boat," which was only a slight exaggeration.[i] This was indicative of the opinion that the rest of the established world had of the U.S. Navy and being that the U.S. Government did not want to seem a weak, young nation, things were about to change.

Things began to change in 1885 after Congress finally took note of the complaints about the "inferior" Navy and took action to build a "new" Navy.[ii] Between 1890 and 1909 many new warships were built of an entirely new fashion to the U.S. arsenal. These were steel hulled and purpose-built for steam power instead of the earlier conversions to steam propulsion.[iii] Included with these were the pre-dreadnought battleships which would evolve into the center pieces of the United States Navy.

It was during this time that the Navy Yard at Pearl Harbor was beginning to flourish in its Pacific outpost. During the reign of King Kalakaua, a coaling station and repair facility were established officially under U.S. cognizance. The coaling station was especially important due to the nature of current boiler technology for which coal was the fuel.

Coal was good for the time, but it required expensive extra manning and storage space, and coal fuel consumption was so much that ships of the day had to plan their routes along known areas where they could take on more coal. Therefore, U.S. government interest began to build in the possibilities of what Pearl Harbor could become in the Pacific. Ideas started forming around building up the naval station at Pearl Harbor and the yard with it. It was not until 1908, though, that Navy engineers surveyed the land where they desired to establish the formal and now existing Shipyard.[iv] Congress finally saw fit to begin investing money in its Pacific possessions due to expanded U.S. interests in the region after the conclusion of the Spanish-American War in 1898. Defense of the Philippines was now a concern, and it would be far easier to maintain an American presence in the region if U.S. military forces did not have to come all the way from the West Coast of the continental U.S.

With this influx of money, establishment and formalization of the propulsion related trades at the Yard continued on more regularly. Pipefitters, boiler repair technicians, and electricians all became skilled at keeping the coal fed boilers in operating order. All kinds of work had to be done constantly to keep the ships seaworthy, so work coordination and planning was always an issue. Technology marches ever forward though, and new systems and equipment would make the jobs of the planners and engineers more difficult.

The early 20th century saw the immense growth in size and capability of battleships. Several naval strategists and theorists, including Alfred T. Mahan, advocated that control of the seas was a country's greatest asset when looking to conduct a war, and he was a proponent of the fleet-in-being. Battleships were the center piece of this theory, and thus the stage was set for the race to build that biggest, most powerful, most impregnable battleships ever known. Mahan also had his own opinions on what should be done about the territorial concerns in Hawaii.

In a correspondence between Mahan and then Assistant Secretary of the Navy Theodore Roosevelt, Mahan urged the annexation of the Hawaiian Islands. In his "confidential" reply, Roosevelt interestingly stated:

"I suppose I need not tell you that as regards Hawaii, I take your views absolutely, as indeed I do on foreign policy generally. If I had my way, we would annex those islands tomorrow… I believe we should build the Nicaraguan Canal at once and in the meantime we should build a dozen

new battleships, half of them on the Pacific coast; and these, battleships should have large coal capacity and a consequent increased radius of action."[v]

Hawaii was definitely on the minds of prominent figures in the capital, and battleships were definitely going to be a permanent fixture in the U.S. Navy for the time being, but propulsion of the great ships would soon change.

The tenure of the coal boiler was not long; Fuel Oil was the emerging fuel technology. In the early 1900s oil refining procedures had been standardized to the point that Fuel Oil, also known as Bunker Oil, was now a better option to feed the fires that moved U.S. Navy ships. This changeover required less manning onboard the ships, because there was no longer the need for the Trimmers or Stokers that kept the coal fires burning properly. Bunker Oil also took up less storage room on the ships, and there would easily be uses found for the extra space.

Other than the change in the type of fuel that was burning in the boiler, there were few other changes. Boiler design did evolve somewhat to suit the new fuel better, but the concept and the purpose remained the same. This also meant that disturbance at the Shipyard was minimal because this was not a completely new boiler system. The mechanics at the Yard only had to become familiar with the new components associated with the new fuel. The change was much larger for the versatility of the ships. They could now sail farther without stopping to refuel and could carry more stores, ammunition, or people with the extra room afforded by the "Navy Special," another name for the fuel oil used aboard the ships. This is the era in naval history that would take the Shipyard through World War I and up to the positioning of the U.S. at the cusp of a Second World War.

With the dry dock having already been completed years before and the trades having been well established over the years, the Shipyard functioned as a well oiled repair and maintenance facility. Shops repaired valves, re-tubed condensers, and repaired the brick facings in the boiler furnaces. There was no preparing the Pearl Harbor Naval Shipyard for what it would soon face, though.

At 0750 on Sunday morning, December 7, 1941, the Japanese attacked the U.S. fleet at Pearl Harbor and other military assets around Oahu.[vi] The Shipyard was actually one of the major targets of a third wave that was called off by the Japanese commander. The first two waves of the attack had severely crippled the U.S. Army and Navy's war fighting ability, but the proposed third wave, which was called off, would have proved to have longer-term effects.[vii] With the military targets destroyed the third wave was to center on the Shipyard itself and other infrastructure targets like the oil farm. Destruction of these targets would have greatly prolonged the emergency response and repair efforts which would already take many months. Structurally, the dry docks of the Shipyard, even though some of the vessels inside them had been damaged, were in good shape, and other damage to Shipyard assets was mostly superficial.

Thus began the greatest salvage operation the U.S. Navy has ever known. With the Shipyard facilities mostly all intact and workers flowing in to help with the repair effort, the massive undertaking of getting the U.S. Pacific Fleet back underway was begun. It would be years before repairs would be complete and the people of Hawaii would never forget the attack, but a great force of will was awakened by the attack which motivated everyone to do what they could and sacrifice whatever necessary to help the cause.

Inspections and surveys began immediately on those ships that were still afloat to assess what was necessary to get them fixed, or to decide what their fate would be otherwise. USS *Cassin*, USS *Downes*, and USS *Pennsylvania* were in Dry Dock #1 during the attack. All three were damaged in the attack, but being smaller and less armored *Downes* and *Cassin* took the worst of the damage. During the inspection of the machinery rooms onboard *Downes*, it was found that Boiler #4 had taken the worst of the damage with its turbines, economizers, and superheaters "demolished" by the detonation of a torpedo tube directly overhead.[viii] It was determined that *Downes* and *Cassin* needed to be moved as soon as possible either by salvage or floating so that the dry dock could be freed for other vessels, but this was given less priority due to the fact that a battleship could still fit in with the two crippled boats; only aircraft carriers would not fit, but none of those were damaged at the time.[ix]

What equipment could be salvaged from *Downes* and *Cassin* was stripped and sent to Mare Island Shipyard in San Francisco where new hulls were being laid for the ships to be constructed anew.[x] This was just one instance of significant damage to propulsion systems on the attacked vessels at Pearl Harbor. All vessels hit required extensive inspections and major repair if not complete overhaul to main propulsion systems and associated machinery and piping systems.

Of the propulsion systems that were of great concern,

the turbo-electric drive systems of the USS *California* and the USS *West Virginia* were on the top of the list. Instead of their propulsion boilers being tied to steam driven turbines attached to the propeller shafts, the boilers of *California* and *West Virginia* were linked directly to General Electric or Westinghouse turbines that generated electricity for the four 62-ton alternating-current motors that turned each shaft.[xi] It was so important to preserve these systems properly when the water was drained from the machinery rooms that the Salvage Officer Captain Homer N. Wallin issued a special salvage bulletin outlining the proper procedure. In the procedure, Captain Wallin outlined how a fresh water supply should be staged before any uncovering of these pieces of equipment. Once uncovered, they should be flushed with fresh water for four hours, and let to dry completely.[xii] It had been found that if this procedure was followed properly that there was a good chance that these components could be repaired and returned to service.

Such was the constant toil of the machinery trade shops of the Shipyard during the repair of the ships damaged during the attack. Never since has the Yard faced salvage and repair operations anywhere near that magnitude, but technology has marched on and so has the Shipyard to stay current and essential in the repair and maintenance of the U.S. Pacific Fleet. This has included learning to deal with not only new propulsion technologies, but also learning new ways of quality assurance and work oversight.

As diesel engine technology advanced, large platform propulsion became a reality and many of the new Destroyers and Frigates began to be built with either diesel engines or with newer gas-turbine engines. The Shipyard rolled with the punches and opened new shops to take on repair of these new engines and systems. Then came one of the great leaps forward with a conventional propulsion system, but unconventional fuel: nuclear steam generator systems. Basically these systems operate in the same sense as a coal or fuel oil boiler but instead of a fueled fire providing the means for heating water to steam, a nuclear reaction provides the heat.[xiii] Some of the components in these systems are very different, but many are similar to those that the Shipyard was already accustomed to working on, so the actual work was not changed all that much. What did change was the work controls due to the fact that this work was now being done on nuclear systems in which the costs of mistakes can be enormous. The knowledge of the gravity of these mistakes and the general economic benefit of avoiding re-work provided the basis for new programs at the Shipyard.

Pearl Harbor Naval Shipyard has learned over the years like any other organization or living being: through experience. Quality Assurance programs have been instituted over the years to ensure among other things that proper materials are being used in the proper systems, systems are assembled to specification, and that the people who are performing the work are qualified to do so. This has not completely eliminated mishaps over the years, but it has greatly reduced them and also created a mechanism for identifying causes and correcting them so that errors are not duplicated.

Altogether, the Shipyard at Pearl Harbor has come a long way in its short life. Just like the rest of our country, 100 years for the Shipyard have been marked with considerable change, but, it has responded time and again with a ready and willing attitude to take on new challenges. This is what will keep the Shipyard alive and well for many years to come.

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[xii] Vice Admiral Homer N. Wallin (Retired), *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal* (Honolulu, HI: University Press of the Pacific, 2001), 339-341.

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ADVANCES IN NAVAL SHIPYARD TECHNOLOGY: INNOVATION AT PEARL HARBOR

By Stephen Watkins

Technological advances during the 20th century have come about at an incredible rate. From automobiles to airplanes, ice-makers to the Internet, the imagination of humankind has flourished creating tools that make life easier and work more efficient. This innovation has taken us beyond our solar system and to the depths of our oceans. It has created weapons of terrible destruction, but has also let us observe the tiniest building blocks of life. It is this same innovative spirit that permeates the existence of the Pearl Harbor Naval Shipyard. For the last century, the men and women serving there have been dedicated to completing their mission of "continually improving ship maintenance to meet their customer's expectations."[i]

This dedication to looking at new ways to accomplish the mission is seen even in the inception of the Pearl Harbor Naval Shipyard. Its birthday is most commonly dated to a 13 May 1908 congressional act that, along with providing money for dredging Pearl Harbor, also appropriated funds for the building of a dry dock.[ii] Since a dry dock would be fairly useless without carpentry and blacksmith shops, power plants, housing for workers and all of the other necessary buildings, construction began on these as well. Unfortunately on 17 February 1913, the initial dry dock, appropriately named Pearl Harbor Dry Dock #1, which was already over-budget and behind schedule, collapsed during un-watering under its own weight due to inferior concrete and exploded.[iii]

It was not until 1914, that construction resumed on Dry Dock #1, but here one is able to see what was probably the first application of a new and radical concept in the history of the Pearl Harbor Naval Shipyard. In preparation, the hollowing out of the area to be used for the new dry dock went to a depth of 55 feet and a smooth surface for the structure was created by 7 feet of crushed rock. Landauer details the new method and materials then used for creating the structure of the dry dock:

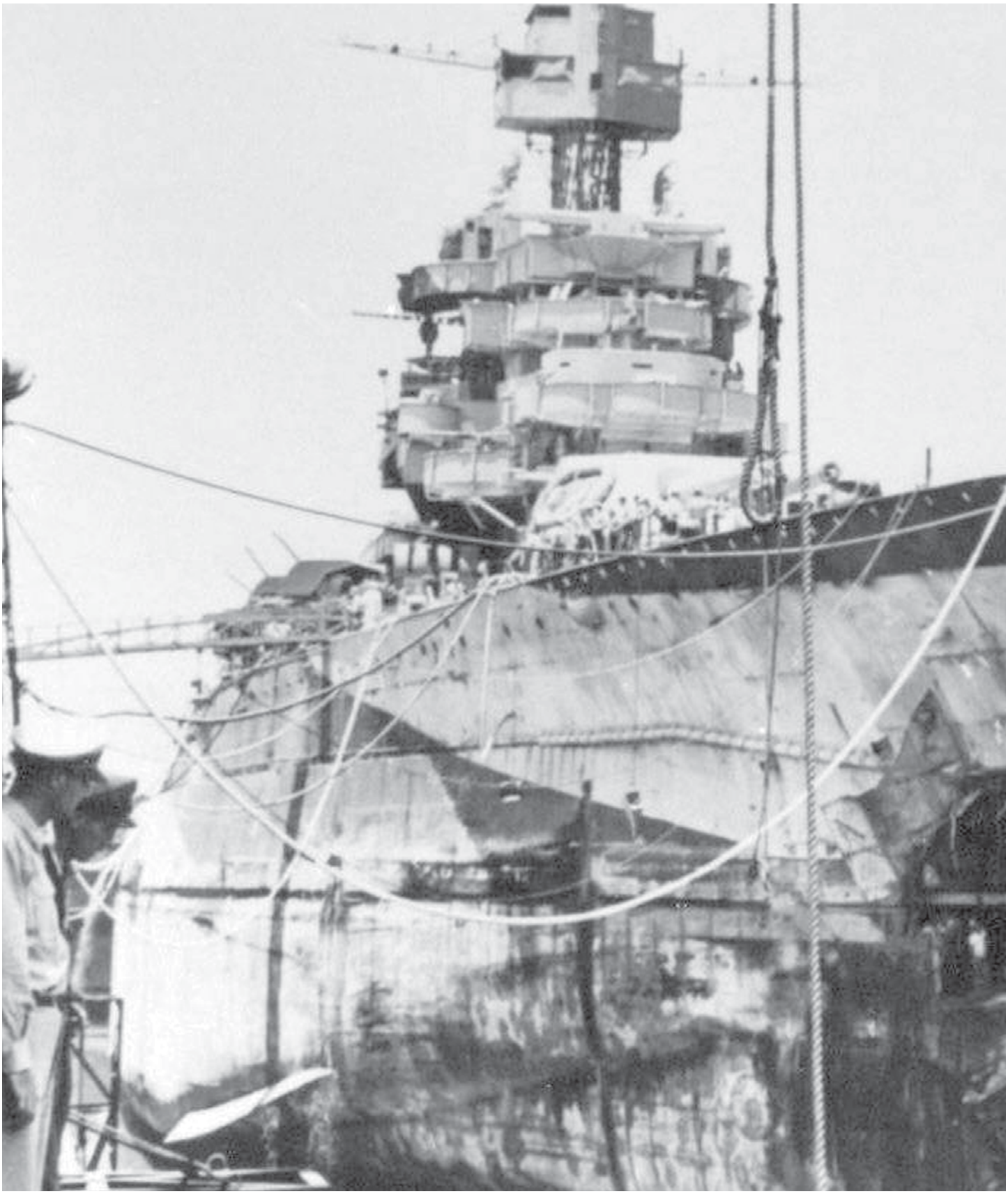
"The 1020 foot length of the dry dock was divided into 16 sections. For each section a slab was built 'in the dry.' Each slab was 60' wide, 152' long, and 16' thick. They were reinforced with 1⅛ inch diameter steel rods placed 16 inches on centers with alternate layers 18 inches above the previous layer and laid in a direction perpendicular to it. The concrete was made with a new formula and different ingredients than the concrete in the first dock and cured in the open air."[iv]

Each one of these sections was then floated on pontoons out to its place and dropped onto the bed of gravel. Concrete was then poured over the entire surface to create one whole structure that would prove to be much more resilient than the first. Fully completed in April 1919, Dry Dock #1 became the focal point of the new shipyard and its opening was given a great deal of fanfare. Thanks to creativity and a willingness to try new ideas, this dry dock was successfully built and able to service the Navy's ships.

World War I turned attention away from the Pacific theater, and as so often happens, a lack of interest leads to creative stagnation. This is not to say that Pearl Harbor did not receive its share of funding to establish itself as a Naval Station; especially in the post-war years. By 1934, nearly $42 million dollars was spent on the development of Pearl Harbor with a considerable amount of this funding going to the Shipyard.[v] However, this was to maintain the status quo of facilities, barracks, command and all other structures necessary to a functioning Naval Station. The focus was on the Shipyard and the installation establishing itself as a functional military operation and also as a member of the community at large.

Around 1936, and in the years leading up to the second World War, one sees a definite shift in the way the Shipyard carried out its day-to-day business. For one, the Shipyard was until this time seen as a separate unit from the Naval Station at large. Most of its officers actually held positions on the staff as collateral duty and the Commandant had limited authority over many of the units, including the Shipyard and the submarine base.[vi] This began to change in the pre-war years, however. Operations were brought under direct control of the Commandant with the chain of command extending to the Commander in Chief, Pacific. This allowed the Pearl Harbor Naval Shipyard to make better use of Navy programs, most notably in this case, the "Benny Sugg."

"Benny Sugg" is an acronym for Beneficial Suggestion, and was and still is (though under a different moniker) a wonderful tool for the worker performing a difficult, dan-



Damaged hull of the USS Maryland, Pearl Harbor, HI, 1944. Official U.S. Navy Photo

gerous or time consuming job to make suggestions on how to make their job easier, safer, more efficient or in the best of situations, all three. In peacetime, one most likely has the luxury of taking the time to perform a task correctly, not to mention having the proper resources. During a time of war, however, this is often not the case. Tasks must be completed as soon as possible and proper tempo must be maintained in order to keep pressure on the enemy. With a major confrontation in the Pacific looming on the horizon, the ability for all to provide input on time-saving innovation was paramount at the Pearl Harbor Naval Shipyard.

There are many terrible and horrific accounts of December 7, 1941, but amidst the wreckage and fire, hope and determination were not vanquished. If any good can be said of this "day of infamy" it is that it served to galvanize the American spirit. Prange writes that there was even a thread of relief to run through the Americans; "relief that Japan had taken the United States off the hook and made the decision [to enter the war] for it" and furthermore "relief that the Americans could stop the talk and half measures and get on with the real job."[vii] The real job here turned out to include new ways of building and repairing ships that until this time were limited solely to the imagination.

For instance, machining, that is the creation or repair of metal parts using raw materials, was for obvious reasons an integral part of ship repair and the machinists at the Pearl Harbor Naval Shipyard in the 1940s touted themselves as the best in the world.[viii] By 1943, they had taken a rarely used process known as sintering, where metal dust is pressed into the desired shape and then baked at low temperatures until it hardens, that until this time had only been used for very small simple parts and applied it to making complex pieces of ship's equipment. All of this was accomplished without sacrificing any hardness or durability. One example given is of a gun part that "once took two hours of skilled labor to shape" and with the new process took just seconds.[ix] Moreover, sintering was waste neutral. That same gun part when shaped by hand could "result in a loss of 50 to 70 percent of the solid metal, scrapped in the form of chips and shavings."[x] The parts created by sintering ranged in size from an ounce to a 65 lbs. ball bearing.

Beyond being a time and resource saver, this new application yielded an interesting side effect. When a volatile, like gunpowder, was added to the powdered metal they found the final product would still be just as durable but would also be porous. This led to the design of the "self lubricating bearing that sucks up oil as a sponge absorbs water, and gradually doles it out during a lifetime longer often that that of the machine."[xi] This new application was so successful that other commercial manufacturers at the time adopted it. It was used most notably by General Motors and Chrysler, but also by the National Cash Register Company that created a ribbon-less typewriter. It was said to type several hundred thousand words before needing new ink.

War-time efficiency and innovation is not all in the technology, however. Sometimes it rests with the dedication of the repair crew as was the case with the repair of the USS *Maryland*. The USS *Maryland* was torpedoed in 1944 in the Battle of the Marianas and brought to the Pearl Harbor Naval Shipyard for repair. The procedure for restoring the *Maryland* was "routine," however, the time-table for and the location where the repairs were completed were far from normal. Crews met the ship as she was returning and began the first phase of any repair, clearing away damage, before the *Maryland* even arrived at Pearl Harbor. Shops began producing new pieces at the same time as the assembly process so that in some cases new equipment was created and installed the same day.[xii] What is more the USS *Maryland*, having been built in 1921, was a riveted ship. The Shipyard had a distinct lack of qualified riveters at the time, but what they did have were welders. Unfortunately, up until then, arc-welding was used only as a "break-fix" to repair ships quickly, but the Shipyard "automatically proceeded to whip a welded design into shap [*sic*], and obtained approval of its use from the Bureau of Ships.[xiii] The result of the Shipyard's workers efforts in repairing ships at sea, applying new methods and generally speeding up their process was that the *Maryland* was repaired in considerably less than the 49 days originally estimated. It was said that the Pearl Harbor Naval Shipyard performed miracles repairing some battleships and seeing as there were those that arrived for repair and left in less than 14 days is a testament to that fact.[xiv]

From shipbuilding and restoration to the salvage efforts that took place in Pearl Harbor after the December 7 attack, the Pearl Harbor Naval Shipyard played a considerable role in the U.S. victory in the Pacific theater in World War II. Dedication, hard work, and a willingness to experiment and ignore the "way we've always done it" mentality were how the Shipyard contributed so profoundly to the war effort. That same attitude persisted in the Pearl Harbor Naval Shipyard throughout the years and still does today.

An article in the Pearl Harbor Shipyard Log from 1955

details the process of writing out a "Benny Sugg" and goes on to encourage all the Shipyard workers to use them whenever possible detailing the benefits of saving the Shipyard and the taxpayers money.[xv] The article also mentions a potential cash reward. In the late 1960s and early 1970s, the Shipyard saw a renaissance of the aforementioned "Benny Suggs." Perhaps it was the involvement of the United States in another Asian war (Vietnam), but nevertheless Pearl Harbor workers were coming up with new and better ideas about how to go about their jobs every day.

One such suggestion was submitted by a rigger who came up with a new way to test cable strength using a "hydraulic wire test machine, which is rather like the 'stretch rack' found in medieval dungeons."[xvi] What was so important about this suggestion is that it eliminated the need for six other workers and the portal crane to be involved in the process. Originally the cable had to be taken to a test lab and hooked up to a crane with test weights. Now the tests could be done in-house with simulated weights up to 175,000 lbs.[xvii] The crane, on the other hand, while not by any means being a new form of technology was still one of the most necessary tools in any shipyard. The fact that it was no longer "tied-up" testing cables was a boon to the Shipyard workers and a very effective time-saver.

The modern Shipyard still has its share of "Benny Suggs." In 2003, the Moonshine program was developed at the Pearl Harbor Naval Shipyard at the behest of Union Leadership to create a focal point for process improvement. Melissa Lamerson, a member of the Moonshine Team, detailed the program saying that it was based on "Mutual Dignity, Respect and Trust" and that the intent was "to improve the working conditions of the people by promoting their process improvement ideas to secure our "No Ka 'Oi" (The Best!) motto that is so prominently displayed on our waterfront building."[xviii] She goes on to say that:

"We have realized that the ideas from our workers can provide truly relevant savings on the waterfront along with bringing our work practices into the 21st century. The true success in our program is the ability to keep the process for the workers informal so that we do not interrupt the flow of creativity. We use a process called "try-storming" which involves something like brain storming, but instead of sitting around and thinking about it, we "just do it!"[xix]

An example of this "just do it" attitude can be seen in the way Shipyard workers have come up with simple solutions to complex problems. Testing indicator lights onboard a ship is a difficult and often cramped task, as testers have to crawl into cramped ship spaces and track an indicator light flickering on and off with a stopwatch. The solution proposed by the Moonshine team is to simply use a video camera. This new process eliminates the need for multiple testers and allows the testers to work in a safer, more convenient environment.[xx] The Shipyard of the 21st century innovates by adaptation in other areas as well, such as using a flat screen LCD television to display mappings of ship systems. "The old method consisted of printing out plans, pasting the sheets of paper together and mounting by stapling them on large rectangular boards."[xxi] The fact that the print-outs often did not line up and the constant markings on the paper obscured the mappings made this process unwieldly at best. The new method has the added benefit of making the mappings available to anyone on a computer.

As one can see the Pearl Harbor Naval Shipyard has a long and rich history of technological innovation including many other innovations and process improvements that the scope of this contribution cannot cover. From the creation of Dry Dock #1 to using precision leveling devices to create the bases of the Nuclear Support Cabinets on submarines, the Shipyard has not only strived to develop best practices, but has involved its employees at every level of the process. It is said that the only accurate predictor of future behavior is past performance. That being the case, this author believes that the Pearl Harbor Naval Shipyard will continue to be pivotal in keeping the fleet "Fit to Fight."

Notes

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[v] Department of the Navy, "Development of the Naval Establishment in Hawaii," *The U.S. Navy in Hawaii, 1826-1945: An Administrative History,* http://history.navy.mil/docs/wwii/pearl/hawaii-3.htm.

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[vii] Gordon W. Prange. *At Dawn We Slept: The Untold Story of Pearl Harbor.* (New York: Penguin, 1982), 583.

[viii] "P.H. Machinists 'Best In World'." *Pearl Harbor Banner,*

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[ix] "A Metallurgical Triumph — Making Machine Parts From Metal Dust." *Pearl Harbor Banner,* 15 October 1943, 5.

[x] Ibid.

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[xii] "Navy Reveals Amazing Story of Repair of Battle-Damaged Ships by Pearl Harbor War Workers." *Pearl Harbor Banner,* 17 November 1944, 4.

[xiii] Ibid.

[xiv] "Miracles of Rejuvenation Performed On Battered Warships In Navy Yards." *Pearl Harbor Banner,* 12 November 1943, 4.

[xv] "Benny Suggs At Pearl." *Shipyard Log*, 22 July 1955, 3.

[xvi] "Rigger Earns Suggestion Reward." *Shipyard Log*, 13 January 1978, 1.

[xvii] Ibid.

[xviii] Melissa Lamerson, email message to the author, 19 February 2008.

[xix] Ibid.

[xx] Melissa Lamerson. "Simple Solution Helps Testers See the Light." *Shipyard Log*, January 2008, 7.

[xxi] Melissa Lamerson. "Electronic Method Streamlines Mapping of Ship Systems."

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THE ROLE OF THE USS HAWAII, VIRGINIA CLASS SUBMARINE

By David Crabtree

Submarines are arguably the most effective weapon platform in the United States arsenal. Maintaining superior submarine technology in relation to our potential enemies is vital to effectively accomplishing the goals of the American Naval Strategy used to secure America's national security. Indisputably, maintaining superior technological improvements and implementing these advancements the moment they became available, demonstrates the importance that American national strategic planners place on remaining at the cutting edge of sub-surface technology. In comparison, the Virginia Class submarine is to America's National Security like the long bread in making a submarine sandwich. The sandwich could not be made without the bread. Securing America's dominance in the Pacific region could not be done without Virginia Class submarines, like the USS *Hawaii*.

The design of the Virginia Class of submarines is the result of perceived limitations on the design of the Los Angeles Class in relation to our potential enemies in the Pacific. As Secretary of the Navy Richard Danzig said at a ceremony commemorating the designation of The USS 776 as the USS *Hawaii*:

"A submarine is a lot like the state of Hawaii. Both are serene and beautiful, quiet and peaceful, yet they are both vitally important to U.S. national security. Like the people of Hawaii, a submarine is very much a part of its environment, is respectful of it, yet uses it to great advantage."

As a Virginia Class submarine, the USS *Hawaii* is prepared to support Naval Operations. U.S. Naval Strategy, coined by Chief of Naval Operations Admiral Vern Clark in 2002, provides the United States of America with national security using three equally important tenants: Sea Strike, Sea Shield and Sea Basing. Sea Strike refers to the ability of the Naval Fleet to project firepower overland in support of ground forces, including coalition forces currently operating in Afghanistan and Iraq. Sea Shield means the securing of the use of the sea to ourselves and our allies and denying the use of the sea to our enemies. Sea Basing justifies the need to pre-position supplies and repair facilities in strategic locations.[ii] The technological advancements a Virginia Class submarine is equipped with enable it to accomplish the mission assigned of accomplishing Sea Shield, but yet add precious support to the other pillars.

A submarine is the most effective platform currently commissioned in the United States Navy for use in Sea Shield, denying the use of the sea to the enemy and securing it for ourselves and our allies. A submarine uses its ability to submerge to become an invisible part of its environment.

This enables a Virginia Class Submarine the ability to close with and destroy the enemy in littoral regions and enemy controlled waters where no surface ship dare go. Submarines were first recognized as the premier naval ship-to-ship fighting platform during World War II.

During World War II, submarines comprised less than two percent of the Navy's personnel strength, yet sank a disproportional amount of enemy ships. All told, in a little over two years, American submarines sank over 1,000 Japanese merchant ships representing over five million tons, a battleship, eight aircraft carriers, 11 cruisers, 42 destroyers and 23 submarines. This accounts for more than half of Japanese ship losses in the entire war.[iii]

The Los Angeles Class submarine was the first boat designed from the keel up to accomplish the two tasks of Sea Power and Sea Strike. The Los Angeles Class submarines were the first specifically designed with the dual purpose of conducting anti-submarine warfare against Soviet submarines trying to sink American capital ships, and the ability to carry out anti-surface ship warfare against Soviet capital ships. The capabilities of this weapon system reflect the Naval Strategy that the American leadership was following when they ordered her built.

Originally, the Los Angeles Class ships were designed almost exclusively to conduct Carrier battle group escort. The ships were fast, quiet and carried an armament of Mk48 and ADCAP torpedoes, Harpoon anti-ship missiles and Tomahawk cruise missiles. The ships were quieter and faster than their predecessors and capable of performing anti-submarine patrols hundreds of miles in advance of the carrier battle group whose path they secured. During the life of the Los Angeles Class of submarines from SSN 688 to SNN 773, several significant design modifications have been integrated without changing the boat's designation as a member of the Los Angeles Class.[iv]

The SSN 719 was the first boat to carry 12 vertical launch tubes for the Tomahawk Cruise missile. It also carried a reactor core that required even less refueling for its propulsion system. These modifications represent an increase in the boat's ability to throw explosive tonnage at the enemy and the ability to sustain itself in its area of operations for extended periods.

The SNN 751 also included these modifications in her construction and runs even quieter. The new advanced BSY-1 Sonar Suite Combat system was included in her command and control package. She was given the ability to lay mines from her torpedo tube. Also, her forward diving planes have been moved from the sail and her sail has been strengthened. This particular improvement has given her the ability to break through ice and operate in arctic conditions. In addition to the improvements that were made to the design of the boat while the class was being built, LA Classes have the ability to be upgraded in shipyards without affecting submarine scheduling. The Los Angeles Class submarine will continue to be modernized as long as they remain commissioned in the United States Navy.

The cutting edge technological improvements were implemented the moment they became available, thus demonstrating the importance of subsurface technology to American national strategic planners. By 2015, 68 percent of the Navy's submarine attack force will still be composed of the LA Class. Los Angeles Class of submarines will continue to be retrofitted with advanced technology as the advanced technology is made available. After market upgrades of computer hardware and software, advanced navigation systems, better sonar and other direction finding equipment will continue to be installed.[v]

As advanced technology is developed, these improvements are simply and routinely installed at United States' shipyards. The USS *Hawaii* and other Virginia Class submarines represent the foremost design improvements that are a part of this process of implementing higher technology to outpace our potential enemies. Admiral Vernon Clark states:

"Our enemies are dedicated to finding new and effective methods of attacking us. They will not stand still. To outpace our adversaries, we must implement a continual process of rapid concept and technology development that will deliver enhanced capabilities to our Sailors as swiftly as possible."

A superior Virginia Class submarine could be the defining moment if the control of the Pacific is contested between the United States and our allies and nations that may potentially be hostile to American interests. Controlling more sophisticated weapon platforms in greater numbers and keeping these seaworthy and patrolling for long periods, is the only way to assure that the United States presence in the Pacific exceeds our enemies' capabilities. American control of the Pacific is the result of constant hard work and internal vigilance, not because our command of the sea goes unquestioned.[vi]

Foreign nations have advanced technology and practice a naval strategy that could potentially challenge the United States' dominance of the Pacific region. Piers Wood of the Naval War College Review writes:

"Our analysis indicated that the PLAN's submarines operating with the inherent advantage of diesel/battery silence (operationally advantageous only in close-in home waters) present U.S. carrier battle groups (as currently configured) with a worrisome set of problems, full of nasty little decisions between unsatisfactory alternatives."

The USS *Virginia* Class of submarines is an attempt to reconfigure the capabilities of the U.S. carrier battle group to remove this Chinese advantage.[vii]

Aircraft carriers are the most capable platform in the Sea Strike strategy because of their potential use in projecting power overland. However, the sophisticated Virginia Class submarine can contribute to Sea Strike by providing security to aircraft carriers. These modern submarines also have the ability to launch cruise missiles from a submerged status aimed at targets deep inland.

The third pillar of Naval Strategy, Sea Basing, will likely be the decisive arm in any future Pacific conflict as the ability to repair battle-damaged ships will keep United States assets seaworthy and in the ideal position to throw ordinance at enemies, affecting the balance of power. Technical expertise in fields relating to repairing battle-damaged ships is of vital importance and is difficult to develop given the constant change of technology as each navy vies for the control of the Pacific. If the day ever comes when a sustained conflict is fought between the United States and other hostile powers in the Pacific, Sea Basing will deliver the restoration of ships quickly.[viii] This may demonstrate to be the influential pillar in the ultimate American naval strategy.

The Sea Basing pillar keeps multi-billion dollar weapons platforms, which would otherwise have been lost to the deep, seaworthy and hurling weight at the enemy. On average it takes three years and $2 billion to build a new

submarine from scratch.[ix] This time frame is longer than the length of any naval war that military planners expect in the future. Any probable war will be over before ships that started to be constructed during the war will affect the balance of power. It is prudent to repair any damaged ship that can be repaired. Having more and better ships in the right place is the only way to win a war. The ability to return damaged ships to service quickly is of utmost importance to American national security and the precious lives of sailors. [x]

The extreme value of the ability of strategically placed shipyards to make life and platform saving differences during emergency situations is proven. On January 8, 2005, the LA Class USS *San Francisco* collided headlong into an underwater mountain about 500 feet below the surface and 300 miles south of Guam. The underwater mountain was not on any of the charts the skipper had available to him for use in navigation. One sailor was killed and several sustained broken bones and severe lacerations as a result of the collision. The fact that the damage control crew was able to save the boat despite being severely injured themselves is a testament to their seamanship. The submarine was able to surface and limp into dry-dock in Guam. The severe injuries were treated and the USS *San Francisco* was completely repaired and returned to service.[xi] Civilian personnel who normally work at Pearl Harbor Naval Shipyard were among those who contributed to the emergency repair operations that took place in Guam.

If this element of Sea Basing had not been pre-positioned there, the multibillion dollar weapons platform, which is comprised of the world's most advanced technology and that assures the United States command of the sea, would have been unnecessarily lost. The specialization of labor and technical expertise associated with a task as complex as saving a sinking ship is a weapons platform of itself. The fleet values experienced shipyard workers to master their various professions so that they are ready in emergency situations.[10] "Seamanship, just like anything else, is an art. It is not something that can be picked up and studied in one's spare time; indeed, it allows one no spare time for anything else."-Pericles 431 B.C.[xii]

There are many highly technical skill sets that must work together in order to accomplish a task as complicated as maintaining a fleet. The Pearl Harbor Naval Shipyard employs mechanics, electricians, fabric workers, insulators, machinists, machine mechanics, painters, plastic fabricators, pipe fitters, riggers and sheet metal mechanics.[xiii] These professions take years to master. If America needed these skills in a time of national emergency and did not have them, she would have a hard time finding or training new ones. Skilled labor in these professions is as much a national resource as oil or grain.

In late 2007, Admiral Roughhead updated the American Naval Strategy to more accurately suit the prevailing geographic-political conditions of a globalized world. The need of the Navy to project combat firepower overland, secure the seas, and forward deploy remain apart of the strategy and will not change for the foreseeable future. Elements of providing homeland security through American inter-service cooperation and international cooperation with foreign navies were added. National strategic planers decided that instead of equipping and manning our Navy to fight a monolithic superpower, such as the Soviet Union, it is necessary to prepare to fight a number of smaller governments or non-state actors, in strategic areas vital to U.S. interests.

The strategy is referred to as the Maritime Strategy. Admiral Roughhead realized that in order to project decisive combat power and control the seas of these isolated regions of infinite geographic-strategic difficulty it is necessary to enlist the assistance of our friends and allies. The tone of the document stresses the need for America to do its part in contributing to collective security around the globe. Security for all nations brought about by alliances among equal nations rather than American decisive combat presence in every corner of the planet. The Virginia Class of submarines was built in accordance with this strategy.

The Virginia Class of submarines is the most technologically advanced class of sub-surface ships ever to stalk the water. There are seven mission tasks assigned to the Virginia Class of submarines which currently include: the USS *Virginia,* USS *Hawaii,* USS *Texas*. Each must be able to out-class the enemy in anti-submarine warfare, even in littoral regions and enemy territory. Each must be able to launch surprising, covert, land-attack missile strikes using vertical launchers and torpedo tubes, out-class the enemy in anti-surface warfare, provide security to carrier battle group gather intelligence, carryout mine laying operations, and to support special operations missions.[xiv]

The technology which comprises the Virginia Class enables it to accomplish the mission assigned. The Virginia Class' design enables it to be quieter than the diesel submarines pitted against it in ways that the Los Angeles Class is not." To achieve this low acoustic signature, the Virginia

Class incorporates newly designed anechoic coatings, isolated deck structures and a new design of propulsion... high-frequency sail arrays acoustic windows and composite sonar domes."[xv]

The command and control system required for the mission demands placed upon the attack submarine is provided by the NE&SS-US which integrates all of the vessel's systems–sensors, countermeasures, navigation, and weapon control into a single man controllable interface. The Commander of the Submarine has the full range of information gathered by the submarine with the click of a mouse, far exceeding the capabilities of anything a prior United States submarine or adversary has been able to accomplish. This is a necessary feature because of the many different missions the submarine is tasked with.[xvi]

Weapons that are capable of effectively accomplishing surprising overland strikes could be provided by the weapons system. The vertical launching system has the capability of launching 16 Tomahawk cruise missiles simultaneously, in an unprecedented show of fire power. This greatly adds to the submarine's ability to carry out covert strikes and support special warfare missions on land.

U.S. Navy Seals can call in strikes of overwhelming force on multiple locations instantaneously. This assures that the tactical element of surprise remains on America's side. Seal teams are carried and inserted clandestinely using Seal delivery vehicles which are an optional part of mission equipment that the attack submarine is capable of carrying.

The most advanced technical innovation installed on the submarine is the use of two Kollmorgen AN/BVS-1 photonic masts in lieu of optical periscopes. This thermal imager and laser rangefinder is far more effective at gathering intelligence than a prism based periscope combined with the human eye. The system is not hull penetrating but is completely contained in the boats sail when not deployed. When masts are hull penetrating the height the mast is limited by the height of the boat's hull. The ships command center must be at the highest point in the boat possible. This limits the amount of space available for other weapons systems to be placed at the officer in charge's disposal. The OIC must also must constantly have his eye glued to the prism lens. With this photonic mast the digital image can be carried by fiber cable to a more convenient and spacious part of the boat and displayed on a monitor.[xvii]

The countermeasure system, AN/BLQ-10 provides full spectrum radar processing, automatic threat warning and situation assessment. This represents an increase in the ability to carry out anti-submarine and anti-ship warfare. The modern technology applied in this countermeasure system, is effective at detecting submarine and surface ships. It can detect hostile boats long before they enter within effective firing range of United States capital ships. This greatly increases the Virginia Class' ability to accomplish the mission of providing security to Carrier battle groups. [xviii] "While most of the Western Pacific is, for the most part free, ships like *Hawaii* and the men who serve on her will help ensure that freedom for future generations," said Adm. Gary Roughead, Commander, U.S. Pacific Fleet, on May 5, 2007, as he delivered the principal address at the USS *Hawaii's* commissioning ceremony.[xix]

As serene and lovely the name USS *Hawaii* conjures, the firepower of a volcano lies within. At a cost of $2 billion, this 377 foot military dynamo can help the crew of 134 men deliver on their promise to serve their country and the Navy by providing for the national security of the United States. The USS *Hawaii* will eventually be home ported in Hawaii in 2009, after shakedown period. The commitment to the Virginia Class Submarine program, including the USS *Hawaii,* is confirmation that the United States Naval Strategy includes maintaining superior submarine technology in relation to our potential enemies. Traveling at the breakneck speed of 25 knots, and running the risk of being compared to a 7,800 ton sandwich, The USS *Hawaii* delivers a serving of pride, with a side of United States National Security.

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